While most components that pass the UFAC performance tests also resist ignition when assembled into finished pieces, UFAC conformance is not necessarily equivalent to cigarette resistance. Some products that meet the UFAC guidelines can still ignite from smoldering cigarettes.

UFAC continually encourages furniture manufacturers, importers and suppliers to subscribe and conform to the voluntary guidelines. While UFAC conformance may continue to increase in the coming years, the level of cigarette resistance among products on the market will be driven by the use of ignition-resistant materials. UFAC encourages but does not require the use of such materials to meet its guidelines. Style considerations as well as technology will affect the trends in materials usage.

A CPSC standard addressing only cigarette ignition would probably have large net benefits to consumers. However, the small open flame risk would be largely unaddressed. The cigarette and open flame resistance of most lower-priced furniture made with predominantly (and already smolder-resistant) thermoplastic fabrics would not be affected.

V. Polyurethane Foam Petition

In 1999, the National Association of State Fire Marshals filed a petition (FP99-1) with CPSC requesting that the Commission develop a rule under Section 4 of the FFA to require labels on upholstered furniture warning the public that polyurethane foam posed a fire hazard. The petition asked that furniture manufacturers provide the same warnings to consumers that manufacturers receive from foam suppliers.

The petition presented upholstered furniture fire data from California, suggesting that fire losses may be lower in California partly because furniture sold in that state contains FR-treated foam and other filling materials to comply with the existing flammability regulation (TB-117). The NASFM petition and CPSC's April 6, 1999 *Federal Register* notice soliciting public comments are attached at Tab K.

NASFM filed this petition with the Federal Trade Commission; FTC denied the petition, noting that CPSC was the most appropriate agency to consider the request. FTC's July 1, 1999 denial letter to NASFM is also attached at Tab K.

A. Staff Analysis of Petition

The staff reviewed the NASFM labeling petition with regard to the nature of the hazard, the potential costs associated with new labeling requirements, and the likely effectiveness of labels at reducing the risk to consumers. The staff also considered likely effectiveness in relation to a possible product performance standard for upholstered furniture. Staff memoranda on the petition are attached at Tab K.

Previous laboratory testing (described in the 1997 staff briefing package) demonstrated that FR polyurethane foam, as used in either California or the U.K., will ignite and continue to burn when a small open flame ignites its cover fabric. While FR filling materials may burn somewhat more slowly (on the order of several seconds) than non-FR fillings, the use of FR foam alone would not be expected to provide a significant increase in safety. With respect to cigarette ignitability, laboratory tests show that conventional, untreated polyurethane foam is cigarette resistant, especially when used in conjunction with thermoplastic-content cover fabrics or thermoplastic (typically polyester) batting between the cover fabric and the foam. Thus, the staff disagrees with the petitioner's implication that non-FR foam would present a significantly greater risk than treated foam.

The likely cost of adding new foam labels to upholstered furniture products would be low. This low cost must be considered, however, in light of the likely safety benefits associated with such a label. These benefits are estimated to be very low, given labels' likely low effectiveness.

Careless smoking or childplay causes most furniture ignitions. Warning labels are not likely to be effective at reducing the risk in these situations. Consumers' risk perceptions and attitudes toward potential fire hazards influence and establish fire safety behaviors such as careless smoking habits. Warning labels, which the consumer may only see when purchasing the products, are unlikely to change these ingrained behaviors. Labels that warn adults to keep lighters and matches out of the reach of children are also unlikely to be effective since children can easily circumvent adults' efforts.

The staff concluded that warning labels, including those proposed by the petitioner, would not significantly reduce upholstered furniture fire risks because their effectiveness relies exclusively on changing human behavior and shifting responsibility for safety to the consumer. Marginal label effectiveness would be especially low compared to that of a performance standard.

B. Public Comments

In response to an April 6, 1999 *Federal Register* notice announcing receipt and docketing of the petition, CPSC received 18 comments from industry, fire safety organizations and consumers. Fourteen comments from fire safety officials (including one supplemental submission from the petitioner, NASFM) and from individual consumers generally supported the petition and advocated more furniture fire safety education and awareness, but did not provide any additional data indicating that labels would be effective.

Three industry trade associations opposed the petition, arguing that:

- CPSC's test data show the petitioner's contention that FR foam is less ignitable is incorrect;
- the petition did not demonstrate the need to focus only on polyurethane foam;
- the existing UFAC program already incorporates consumer labels stating that upholstered furniture is combustible, and additional labels would have minimal benefits to consumers; and
- the petition is duplicative of the Commission's ANPR, which already covers labeling as a possible regulatory option;

Another industry trade group supported labeling as a lower-cost alternative to a product performance rule; this commenter stated that labels could effectively inform parents about childplay fire hazards; they suggested additional smoke alarm awareness programs as an adjunct to a possible labeling requirement.

The staff reviewed the public comments. The issues raised in the comments are discussed below.

Issue: Level of safety provided by FR foam

One industry comment disputed NASFM's suggestion that non-FR polyurethane foam is more dangerous than FR foam. This commenter cited CPSC laboratory test data showing that FR foam meeting California TB-117 does not significantly reduce the fire risk compared to non-FR foam.

As noted above, CPSC's full scale tests of chairs with foam that complied with the resilient cellular material component provisions of TB-117 showed that FR foam ignited and burned when its cover fabric was exposed to a small open flame. In a test of otherwise identical chairs with FR and non-FR foam, chairs with FR foam took slightly longer to ignite, but still ignited and burned. Thus, the available evidence does not support applying labels only to non-FR foam.

Issue: Focus on Polyurethane Foam

Several commenters stated that the presence of polyurethane foam increases the fire risk to consumers. Two industry commenters stated that the petition unfairly focused on the role of polyurethane foam in upholstered furniture fires. They discussed the role of fabrics' and other filling materials' performance in small open flame ignitability.

A labeling requirement would not necessarily apply only to polyurethane foam, but could apply to all filling materials found to present an unreasonable risk. The staff agrees, however, that upholstery fabrics play a dominant role in determining small open flame ignitability in most furniture constructions. While polyurethane foam can contribute greatly to flame spread and toxic smoke generation, it is unclear how a foam-warning label would address the hazard. A label focusing only on foam or other fillings would probably not be very effective at reducing the fire risk to consumers.

Issue: Adequacy of UFAC Label

Three industry commenters cited the existing UFAC label, which incorporates cautionary wording about the general flammability of upholstered furniture, as adequate to inform the public. These commenters stated that an additional label would have little additional benefit, and is therefore unnecessary.

A substantial majority (nearly 90%) of currently produced furniture conforms to the UFAC voluntary guidelines; most of these are equipped with UFAC hangtag labels that mention the combustibility of furniture materials. These labels are more consumer-oriented than the label suggested by the petitioner. The staff agrees that additional labels would add little to the existing safety messages, and may even confuse consumers.

Issue: Duplication of ANPR Scope

One industry commenter stated that the labeling the petition requested could already be considered under the 1994 ANPR. This commenter also stated that much of the foam-related risk cited by the petitioner is associated with the contribution of polyurethane foam to ongoing fires in which the foam was actually exposed to a *large* open flame source (usually the burning fabric), the aspect of the original NASFM petition the Commission already denied.

The ANPR does list labeling as an option to address the small open flame risk. The ANPR included components, such as filling materials, within its scope. The staff agrees that polyurethane foam or other filling materials are rarely the first item ignited in a furniture fire; the staff's draft small open flame standard focuses on the role of cover fabric ignitability and barrier performance, not the relatively minor role of fillings in fire growth. While the CPSC staff considered labeling as a regulatory alternative (or an adjunct) to a performance standard, this option is judged to have relatively little effect on the fire risk to consumers. In view of the substantial estimated net benefits of a performance standard, the staff rejected the labeling approach to addressing the hazard.

VI. Options

The Commission has three separate issues before it with respect to upholstered furniture flammability: whether to issue a notice of proposed rulemaking (NPR) on small open flame ignition; whether to initiate rulemaking on cigarette ignition (a subject of the withdrawn NASFM petition); and whether to grant or deny the NASFM petition on polyurethane foam. The Commission's decisions on each of these issues are independent but interrelated.

A. Small Open Flame Ignition NPR

The Commission's principal charge to the staff following publication of the 1994 advance notice of proposed rulemaking in the *Federal Register* was to develop a small open flame upholstered furniture standard that could be shared with voluntary standards groups or proposed as a mandatory rule. The staff has prepared a small open flame standard addressing this risk, including an analysis of potential benefits and costs of a proposed rule and significant alternatives. Following the Commission's 1998 decision to defer action, the staff also performed an extensive risk assessment of FR chemicals. The staff has taken into account the conclusions and recommendations of the Congressionally-mandated GAO and NAS studies, and has incorporated their findings into the staff's technical reports.

If the Commission preliminarily finds that upholstered furniture presents an unreasonable risk of small open flame fire-related death, injury or substantial property loss, then the Commission may issue a proposed rule for public comment.

If the Commission concludes the available evidence is insufficient to support a preliminary unreasonable risk finding, the Commission may terminate the small open flame proceeding. The Commission may also continue to defer action and direct the staff to obtain additional information.

B. Cigarette Ignition

While NASFM withdrew the remainder of its petition, which requested action on the cigarette ignition hazard, the Commission may consider the issue of cigarette ignition for possible regulatory action. The staff's evaluations of cigarette ignitability and UFAC conformance are completed.

The staff's 1997 briefing package contained an evaluation of the cigarette ignition resistance of currently manufactured furniture, and of the level of industry conformance to the UFAC voluntary guidelines. The staff found both to be high, even

though there continue to be hundreds of deaths and injuries from cigarette-ignited furniture fires, and a standard addressing this risk alone may be feasible. The beneficial impact of a cigarette ignition standard would, however, be significantly reduced if the Commission issued a small open flame standard with large cigarette ignition side benefits, as projected for the staff's draft standard.

If the Commission finds that upholstered furniture may present an unreasonable risk of cigarette fire-related death, injury or substantial property loss, then the Commission may issue an advance notice of proposed rulemaking for public comment.

If the Commission does not believe that an unreasonable risk exists, the Commission may direct the staff to do no more work in this area. The Commission may also continue to defer action (e.g., pending further consideration of the small open flame issue).

C. NASFM Petition: Polyurethane Foam Labeling

The staff did not prepare a separate briefing package on this issue, but included it in this package so the Commission could take action on the petition in the context of its consideration of the other issues above. The staff evaluated the merits of the petition and analyzed the public comments received. The staff concluded that the effectiveness of flammability warning labels on furniture containing polyurethane foam would probably be low. A standard addressing either the small open flame ignition risk or the cigarette ignition risk would be much more effective.

If the Commission finds that upholstered furniture containing polyurethane foam may present an unreasonable risk of fire-related death, injury or substantial property loss, then the Commission may grant NASFM petition FP 99-1 and issue an advance notice of proposed rulemaking for public comment.

If the Commission does not believe that an unreasonable risk exists, the Commission may deny the petition, or defer action pending further information.

VII. Conclusions

Since the staff transmitted its 1997 briefing package to the Commission, the staff has gathered extensive information on a wide variety of technical, scientific and economic issues related to upholstered furniture flammability. This includes substantial laboratory test data and analyses on flammability and FR chemicals, reports and analyses submitted by outside organizations, and the results of the GAO and NAS studies.

The staff concludes from the available data that a small open flame standard for upholstered furniture is technically and economically feasible. A number of FR chemicals could be used in upholstery fabrics to meet such a standard without posing significant health or environmental risks. The staff has developed a standard that would be effective, would have net benefits to consumers, and would minimize economic burdens on small businesses.

Since CPSC published its ANPR in 1994, the staff has consistently encouraged members of the affected industries to work on developing a voluntary standard. While these industry representatives have not yet put forth any voluntary test method or draft standard, they have over the past year formally announced their commitment to reducing open flame hazards, and have reported progress toward developing a small open flame performance standard.

While a standard addressing only cigarette ignition resistance may, on its own, have large net benefits to consumers, such a standard would leave the significant risk of small open flame ignition largely unaddressed. The staff's draft standard would reduce both small open flame and cigarette ignition risks to consumers without the need for two test protocols.

The staff also concludes that labeling requirements for polyurethane foam in upholstered furniture would be minimally, if at all, effective at reducing upholstered furniture fire risks. Most small open flame-ignited fires are the result of childplay, a scenario not greatly affected by labeling. The vast majority of currently available upholstered furniture is cigarette ignition resistant, partly by virtue of its polyurethane foam content, so labeling would not materially address that risk. Even though the cost of a labeling rule to consumers would be low, the likely benefits would be negligible, especially in view of the likely effectiveness of a proposed small open flame rule.

VIII. Recommendations

In view of the complexity of the issues associated with this standards development activity, the CPSC staff recommends that the Commission defer action on a possible small open flame standard for upholstered furniture, and share the information in this briefing package with all stakeholders before considering whether to issue a proposed rule or take other action. The staff recommends holding a public meeting with interested parties to present the direction of CPSC's draft small open flame standard, to discuss the supporting data, and to receive public comments. This will help ensure full public participation in this complex effort, provide an opportunity for outside groups to present the results of any new studies or other information, and help the Commission determine the need for further action.

If the Commission so directs, the staff will prepare a *Federal Register* notice announcing a public meeting, to be held as soon as possible, on the entire range of pertinent technical issues. Following the stakeholder meeting, the staff will provide to the Commission a summary of the meeting and any further analyses that may be required to support a Commission decision on a possible flammability standard.

The staff further recommends that the Commission deny the NASFM petition on polyurethane foam (FP 99-1) on the basis that labeling would not effectively reduce the risk of upholstered furniture-related fires to consumers.

List of Attachments

TAB A: CPSC *Federal Register* notice, re: Advance Notice of Proposed Rulemaking on Upholstered Furniture, Vol. 59, No. 114, June 15, 1994

Letter from G. Miller, National Association of State Fire Marshals, to the Commission, re: withdrawal Of NASFM petition, October 5, 2001

Letter from R. Medford to G. Miller, NASFM, re: Withdrawal of NASFM petition, October 19, 2001

TAB B: Directorate for Epidemiology report, Upholstered Furniture Fire Loss Estimates 1980-1998, K. Ault, & M. Levenson, February 2001

Directorate for Epidemiology memorandum, Upholstered Furniture Fire Investigations Update: July 1999 to July 2001, M. Levenson, August 28, 2001

Directorate for Epidemiology report, Small Open Flame Ignitions of Upholstered Furniture, K. Ault, December 6, 1999

Directorate for Epidemiology memorandum, Comparison of Upholstered Furniture Fire Deaths in California and the U.S., M. Levenson, November 15, 2000

TAB C: Draft Standard for Small Open Flame Ignition Resistance Of Upholstered Furniture, R. Khanna, Directorate for Engineering Sciences, October 2001

Operations Manuals for Upholstered Furniture Test Fixtures, M. Eilbert, Directorate for Laboratory Sciences, April 14, 2000

Directorate for Engineering Sciences memorandum, Small Open Flame Upholstered Furniture Standard Development Approach, R. Khanna, October 13, 2000

Directorate for Engineering Sciences memorandum, Modification to Draft Standard for Small Open Flame Upholstered Furniture, R. Khanna, March 28, 2001

Directorate for Engineering Sciences memorandum, Cigarette - Open Flame Relationship, R. Khanna, October 23, 2001

Directorate for Epidemiology memorandum, Upholstered Furniture Compliance Testing Program: Statistical Aspects, M. Levenson, October 17, 2001

TAB D: Directorate for Laboratory Sciences Technical Report: Summary of Flammability Tests, Upholstered Furniture Project (1998-2000), L. Fansler, October 19. 2000

Directorate for Laboratory Sciences memorandum, Small Open Flame Ignition Test Results of Flame Retardant Upholstery Fabrics and Intumescent Barrier Fabric, D. LaRue, May 30, 2000

Directorate for Laboratory Sciences memorandum, U.K. Chair and Mockup Test Results, L. Fansler, October 2000

Directorate for Laboratory Sciences memorandum, Alternate Barrier Tests, L. Fansler, October 18, 2001

Directorate for Laboratory Sciences memorandum, Sensitivity Issues and Other Factors Influencing the Flammability of Upholstery Fabrics, L. Fansler, June 2, 2000

Directorate for Laboratory Sciences memorandum, Effects Of Variations to the Seat / Back Geometry, L. Fansler, May 25, 2000

Directorate for Laboratory Sciences memorandum, Effects Of Tap Water Soaking on Upholstery Fabric Flammability, W. Rowe, May 24, 2000

Directorate for Laboratory Sciences memorandum, Effects Of Beverages on the Flammability of Upholstery Fabrics, A. Bernatz, June 6, 2000

Directorate for Laboratory Sciences memorandum, Ignition Tests of Filling Materials Currently Found in Upholstered Furniture, J. Puskar & A. Bernatz, May 25, 2000

Directorate for Laboratory Sciences memorandum, Effect Of Soiling on the Flammability of Upholstery Fabrics, W. Tao, May 26, 2000

Directorate for Laboratory Sciences memorandum, Cleaning And Wear Effects on Upholstery Fabric Flammability, W. Tao, G. Sushinsky, B. Bhooshan, & D. Cobb, May 31, 2000

Directorate for Laboratory Sciences memorandum, Small Open Flame Ignition Results of "Over-the-Counter" Fabric Finishes, D. LaRue, May 10, 2000

Summary Statement on CPSC Interlaboratory Study of Upholstered Furniture Small Open Flame Test Method, September 2000

Directorate for Laboratory Sciences memorandum, Interlaboratory Study of Upholstered Furniture Fabric Flammability Draft Test Method (with attachments), D. Cobb, September 28, 2000

Directorate for Epidemiology report, Interlaboratory Study of CPSC Draft Upholstered Furniture Small Open Flame Test Method: Statement of Precision, C. Morris, September 28, 2000

Directorate for Epidemiology memorandum, Statistical Estimation of the Reduction in Fire Losses from the Adoption of the CPSC Draft Small Open-Flame Standard, M. Levenson, September 14, 2001

Directorate for Laboratory Sciences memorandum, Chemical Analysis of Flame Retardant on Foams and Fiber Fillers from U.K. Chairs, S. Chen, May 31, 2000

Directorate for Laboratory Sciences memorandum, Analysis Of U.K. Upholstery Fabrics for FR Treatment Chemicals, D. Cobb & B. Bhooshan, June 8, 2000

Directorate for Laboratory Sciences memorandum, Chemical Analysis of Barrier Fabrics, D. Cobb, October 25, 2001

Directorate for Epidemiology report, U.K. Chair Upholstery Flammability Test Results, C. Morris, March 12, 2001

Directorate for Laboratory Sciences memorandum, Impact Of Flame Retardant Chemicals, Filling Materials, and Fabric Type on Flammability Testing, D. Cobb & W. Tao, October 2000

Directorate for Laboratory Sciences memorandum, UFAC vs. CPSC Cigarette Tests of Upholstery Fabrics, G. Stafford & A. Bernatz, May 30, 2000

Directorate for Epidemiology memorandum, Review of the Cigarette Ignition Propensity of Upholstered Furniture Meeting the Small Open Flame Standard, M. Levenson, May 18, 2001

TAB E: Letter from K. Hatchel, California Bureau of Home Furnishings & Thermal Insulation, to D. Ray, CPSC, Re: Technical Bulletin 117 revision project, November 19, 1999

Letter from D. Ray, CPSC, to K. Hatchel, California Bureau of Home Furnishings & Thermal Insulation, Re: Technical Bulletin 117 revision project, December 20, 1999

Update Statement on Technical Bulletin 117 Revision, California Bureau of Home Furnishings & Thermal Insulation, March 6, 2001

TAB F: Upholstered Furniture Action Council, Mission Statement On Upholstered Furniture Flammability, August 1, 2000

Alliance for the Polyurethanes Industry, Position Statement on Residential Upholstered Furniture and Mattress Fire Performance, August 2000

American Textile Manufacturers Institute, Policy Statement on Residential Upholstered Furniture Flammability, February 2001

Letter from E. Gerken, Upholstered Furniture Action Council, to R. Medford, CPSC, re: furniture industry Small Open Flame Technical Committee, January 15, 2001

Polyurethane Foam Association, Position Statement on Residential Furniture and Mattress Flammability, May 21, 2001

TAB G: CPSC *Federal Register* notice, re: Flame Retardant Chemicals That May Be Suitable for Use in Upholstered Furniture: Public Hearing, March 17, 1998

Directorate for Health Sciences memorandum, Health Sciences Response to Public Hearing Comments on Upholstered Furniture, P. Bittner & M. Babich, April 4, 2001

CPSC Staff Statement on the National Research Council Report, "Toxicological Risks of Selected Flame-Retardant Chemicals," July 2000

Directorate for Health Sciences memorandum, Update on Flame Retardant (FR) Chemicals Toxicity Reviews, P. Bittner, April 4, 2001

Directorate for Laboratory Sciences memorandum, Migration of FR Chemicals from Upholstery Fabrics, B. Bhooshan & D. Cobb, June 2, 2000

Directorate for Laboratory Sciences memorandum, Identification of P Compounds in Migration Study of Flame Retardant Chemicals from Upholstered Furniture Fabric, D. Cobb, December, 2000

Directorate for Epidemiology memorandum, Statistical Analysis of the Migration of Flame Retardant Chemicals, M. Levenson, November 1, 2000

Directorate for Health Sciences, CPSC Staff Exposure and Risk Assessment of Flame Retardant Chemicals in Residential Upholstered Furniture, M. Babich & T. Thomas, April 4, 2001

Directorate for Health Sciences memorandum, Exposure to Flame Retardant Chemicals in Residential Upholstered Furniture with Fire Blocking Barriers, M. Babich, October 1, 2001

TAB H: Letter from J. Carra, U.S. Environmental Protection Agency, to R. Medford, CPSC, re: Significant New Use Rule for upholstered furniture, July 12, 1999

Letter from W. Sanders, U.S. Environmental Protection Agency, to R. Medford, CPSC, re: Significant New Use Rule status, February 26, 2001

Directorate for Health Sciences memorandum, Priority Ranking of Flame Retardant Chemicals for a Possible Significant New Use Rule (SNUR), M. Babich, March 14, 2001

Letter from C. Reh & J. Nemhauser, National Institute For Occupational Safety & Health, to D. Ray, CPSC, Re: Worker Health Hazard Evaluation Study on Upholstered Furniture, February 15, 2001

TAB I: Directorate for Economic Analysis report, Economic Analysis of Regulatory Options to Address Small Open Flame Ignitions of Upholstered Furniture, C. Smith, October 2001

Directorate for Economic Analysis memorandum, Upholstered Furniture Flammability: Analysis Of Comments, C. Smith, October 23, 2001

Directorate for Epidemiology memorandum, NERA Report on Upholstered Furniture Flammability Standard, M. Greene, M. Levenson, R. Roegner, & L. Smith, April 16, 2001

Division of Human Factors memorandum, Response to National Economic Research Associates (NERA) Regarding Upholstered Furniture Fires, C. Meiers, March 22, 2001

TAB J: Directorate for Economic Analysis report, Upholstered Furniture Small Open Flame Resistance Standard: Preliminary Environmental Effects, R. Franklin, March 2001

TAB K: Petition FP 99-1: letter from R. Garbiele, National Association of State Fire Marshals, to S. Dunn, CPSC and D. Clark, Federal Trade Commission, re: Fire Hazard Warning Label on Certain Upholstered Furniture (with attachments), March 8, 1999

CPSC *Federal Register* notice re: Petition Requesting Labeling Rule for Polyurethane Foam in Upholstered Furniture, Vol. 53, No. 61, April 8, 1999

Letter from B. Berman, Federal Trade Commission, to R. Gabriele, National Association of State Fire Marshals Re: Denial of Petition for Rulemaking: Fire Hazard Warning Label on Certain Upholstered Furniture, July 12, 1999

Division of Human Factors memorandum, Petition Requesting a Labeling Rule for Polyurethane Foam in Upholstered Furniture (FP 99-1), C. Meiers, February 28, 2001

Directorate for Laboratory Sciences memorandum, Response to Petition Requesting Labeling Rule for Polyurethane Foam in Upholstered Furniture, L. Fansler, September 13, 2000

Directorate for Economic Analysis memorandum, Petition Requesting a Labeling Rule for Polyurethane Foam in Upholstered Furniture, C. Smith, March 30, 2001

UPHOLSTERED FURNITURE FLAMMABILITY
CPSC Staff Project Team

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TAB A

CONSUMER PRODUCT SAFETY COMMISSION

16 CFR Part 1640

Upholstered Furniture; Advance Notice of Proposed Rulemaking; Request for Comments and Information

AGENCY: Consumer Product Safety Commission.

ACTION: Advance notice of proposed rulemaking.

SUMMARY: Based on currently available information, the Commission finds that a new flammability standard or other regulation may be needed for products of upholstered furniture and for fabrics and related materials used in, or intended for use in, upholstered furniture, to protect the public against the unreasonable risk of fire leading to death, personal injury, or significant property damage. The specific risk of fire is from the ignition of upholstered furniture from small open-flame sources.

This advance notice of proposed rulemaking ("ANPR") initiates a rulemaking proceeding under the authority of the Flammable Fabrics Act ("FFA"). One result of the proceeding could be the promulgation of a standard or other regulation mandating performance and/or labeling requirements for these products. Another possible outcome could be a voluntary standard that adequately addresses the identified risk of injury.

The Commission solicits written comments from interested persons concerning the risk of injury and death associated with the ignition of upholstered furniture from small open flames, data on small open-flame testing of upholstered furniture, the regulatory alternatives discussed in this notice, other possible means to address these risks, and the economic impacts of the various regulatory alternatives. The Commission also invites interested persons to submit an existing standard, or a statement of intent to modify or develop a voluntary standard, to address the risk of injury described in this notice.

DATES: Written comments and submissions in response to this notice must be received by the Commission by August 15, 1994.

ADDRESSES: Comments should be mailed, preferably in five (5) copies, to the Office of the Secretary, Consumer Product Safety Commission, Washington, DC 20207–0001, or delivered to the Office of the Secretary, Consumer Product Safety Commission, room 502, 4330 East West Highway, Bethesda, Maryland 20814; telephone (301) 504–0800.

FOR FURTHER INFORMATION CONTACT: Dale R. Ray, Directorate for Economic Analysis, Consumer Product Safety Commission, Washington, DC 20207; telephone (301) 504–0962, ext. 1323.

SUPPLEMENTARY INFORMATION:

A. Background

1. *The Petition.* In 1993, the National Association of State Fire Marshals ("NASFM") petitioned the Commission (Petition FP 93–1) to issue a flammability standard for upholstered furniture incorporating the requirements of three standards now in effect in the State of California. Specifically, the petition urged the Commission to issue a flammability standard incorporating the requirements of Technical Bulletins 116, 117, and 133, issued by the Bureau of Home Furnishings and Thermal Insulation of the State of California. These standards specify tests to measure the (a) resistance of components of upholstered furniture to ignition by small open-flame sources and cigarettes; (b) resistance of finished items of upholstered furniture to ignition by cigarettes; and (c) resistance of finished items of furniture to ignition from large open-flame sources. The California standards also contain labeling requirements.

In support of the petition, NASFM provided information about deaths and injuries from fires involving upholstered furniture in California and in the rest of the United States. The petition asserted that although deaths and injuries from fires involving upholstered furniture in the United States declined appreciably from 1980 through 1989, during the same period the numbers of deaths and injuries from upholstered furniture fires declined at a much faster rate in California.

The petitioner provided data showing that the rate of fire deaths associated with upholstered furniture in the United States, excluding California, decreased from 4.97 per million people in 1980 to 3.04 per million in 1989, a decline of 39 percent. By comparison, in 1980 the rate of fire deaths associated with upholstered furniture in California was 1.14 per million people and in 1989 it was 0.41 per million, a decline of 64 percent.

The Commission published a notice in the **Federal Register** on August 9, 1993 (58 FR 42301), announcing that the submission from NASFM had been docketed as a petition and soliciting written comments on the petition from all interested parties. Seventy-two comments were received in response to that notice. The Commission staff prepared a briefing package on the petition discussing information relevant to the decision to grant or deny the petition. The briefing package, dated April 8, 1994, contains a discussion of the comments received and other relevant information. It is available upon request from the Office of the Secretary of the Commission. The staff presented an oral briefing to the Commission on the petition on May 3, 1994.

2. *Commission Action.* At a decision meeting on May 12, 1994, the Commission voted 2–1 to grant that part of the petition requesting development of a flammability standard to address risks of death, injury, and property damage from small open-flame ignition of upholstered furniture.[1] The Commission also voted (unanimously) (i) to defer action on that part of the

[1] Commissioner Gall dissented from this vote.

petition requesting development of a flammability standard addressing risks of death, injury, and property damage from cigarette ignition of upholstered furniture, and (ii) to direct the staff to conduct an additional, limited investigation of the cigarette ignition issue. Finally, the Commission voted 2–1 to deny that portion of the petition requesting development of a flammability standard to address risks of death, injury, and property damage from large open-flame ignition of upholstered furniture.[2]

The information presently available to the Commission demonstrates that in 1991 approximately 150 deaths, 580 injuries, and $66 million in property losses resulted from the ignition of upholstered furniture by small open flames. Although the upholstered furniture industry has implemented a voluntary program to improve the resistance of upholstered furniture to ignition by cigarettes, that program has no provisions to address risks of small open-flame ignition.

The State of California enforces mandatory requirements for upholstered furniture components. These requirements are intended to improve resistance of upholstered furniture to ignition by small open-flame sources. Information available to the Commission indicates that almost all of the furniture produced for sale in California meets that State's mandatory requirements to address risks of small open-flame ignition of upholstered furniture. This information suggests that a Federal standard to address those risks may be effective and technologically and economically practicable.

As noted, the Commission unanimously voted to defer a decision on the part of the petition dealing with cigarette ignition of upholstered furniture. Despite a significant number of reported incidents, since 1980, deaths associated with upholstered furniture fires ignited by cigarettes have declined by almost 60 per cent. As noted above, the upholstered furniture industry has implemented a voluntary plan to improve resistance of upholstered furniture to cigarette ignition. However, the Commission has not assessed the resistance of currently-produced upholstered furniture to cigarette ignition or determined the extent to which upholstered furniture conforms to the industry voluntary program.

If most currently manufactured upholstered furniture resists cigarette ignition, the benefits to be derived from issuing mandatory requirements to address that risk may be small. However, if a large proportion of currently manufactured upholstered furniture can be ignited by a smoldering cigarette, a mandatory standard to address that risk may be needed.

For these reasons, the Commission decided to defer a decision on that portion of the petition requesting development of a mandatory standard to address risks of death, injury, and property damage associated with upholstered furniture ignited by cigarettes until the staff obtains certain additional information. This may include the extent to which currently manufactured upholstered furniture resists cigarette ignition and conforms to the industry's voluntary plan.

After examining all available information about deaths, injuries, and property losses associated with fires resulting from ignition of upholstered furniture, the Commission voted to deny that portion of the petition requesting development of a flammability standard to address risks of death, injury, and property damage associated with ignition of upholstered furniture by large open-flame sources. The State of California enforces a flammability standard to address risks of large open-flame ignition of upholstered furniture used in public occupancies without automatic sprinkler systems. However, that standard does not apply to furniture intended for residential use. Therefore, the Commission has no specific information about the extent to which a Federal flammability standard similar to the California large open-flame requirements could be expected to reduce deaths, injuries, or property damage from residential fires originating with ignition of upholstered furniture by a large open-flame source.

The Commission also considered information indicating that if the California requirements intended to address large open-flame ignition of upholstered furniture were applicable to all residential furniture sold in the United States, the total annual cost of compliance could exceed $2 billion, and could add an estimated $75 to the average price of items of upholstered furniture.

In view of the absence of information indicating the likelihood of a substantial reduction in deaths, injury, and property damage from large open-flame ignition of upholstered furniture, and estimates of substantial costs resulting from the imposition of requirements to address risks from upholstered furniture fires ignited by large open-flame sources, the Commission decided to deny that portion of the petition requesting issuance of a standard to address those risks.

B. Statutory Authority

This proceeding is conducted under provisions of the FFA, 15 U.S.C. 1191–1204. An item of upholstered furniture is a "product" of "interior furnishing" as those terms are defined in sections 2(e) and (h) of the FFA. 15 U.S.C. 1191(e) and (h). The Commission has authority under section 4(a) of the FFA to issue a "flammability standard or other regulation, including labeling," for a product of interior furnishing if the Commission determines that such a standard "is needed to adequately protect the public against unreasonable risk of the occurrence of fire leading to death or personal injury, or significant property damage." 15 U.S.C. 1193(a).

A proceeding to promulgate a regulation establishing a flammability standard for upholstered furniture begins by publication of this advance notice of proposed rulemaking as provided in section 4(g) of the FFA. 15 U.S.C 1193(g). If the Commission decides to continue the rulemaking proceeding after considering responses to the ANPR, the Commission must publish the text of the proposed rule, along with a preliminary regulatory analysis, in accordance with section 4(i) of the FFA. 15 U.S.C. 1193(i).

If the Commission then wishes to issue a final rule, it must publish the text of the final rule and a final regulatory analysis that includes the elements stated in section 4(j)(1) of the FFA. 15 U.S.C. 1193(j)(1). Before the Commission may issue a final regulation, it must make findings concerning voluntary standards, the relationship of the costs and benefits of the rule, and the burden imposed by the regulation. FFA section 4(j)(2). 15 U.S.C. 1193(j)(2).

C. The Product

The items within the scope of this ANPR include: (1) Products of interior furnishing that are used in homes, offices, and other places of assembly and public accommodation that consist in whole or in part of resilient materials (such as polyurethane foam, cotton batting, or related materials) enclosed within a covering consisting of fabric or related materials, and (2) fabric or related materials used or intended for use in the production of upholstered furniture.

D. The Upholstered Furniture Industry

The Commission estimates that there are over 1,000 manufacturers, and a small number of importers, of upholstered furniture in the United States, accounting for an estimated 25–30 million pieces shipped annually.

[2] Chairman Brown dissented from this vote.

Shipments are concentrated among the major producers; the 50 largest firms reportedly account for over half of all upholstered furniture sales. Most of the remaining manufacturers are small firms, none of which accounts for a significant proportion of sales.

E. Risks of Injury and Death

In 1991, about 16,600 residential fires involving ignition of upholstered furniture resulted in 700 deaths, over 2,000 injuries and nearly $300 million in property damage in the United States. Two-thirds (470) of the deaths and more than half (1,160) of the injuries resulted from smoldering-ignition smoking fires; about one-fifth (150) of the deaths and one-fourth (580) of the injuries resulted from open-flame-ignition fires (often identified as involving matches and lighters). Nearly half ($137 million) of the property damage was from smoking fires; about one-fifth ($66 million) was from open-flame fires. The total annual societal cost of upholstered furniture fire losses is estimated at about $2 billion, including about $1.25 billion from smoking fires and nearly $0.5 billion from open-flame fires.

Since 1980, total furniture fire deaths in the United States declined by slightly over half. Smoking fire deaths declined by 59 percent, while open-flame fire deaths declined by 25 percent. Injuries and property damage also declined by 34 and 28 percent, respectively.

A number of factors probably contributed to the decrease in furniture fire losses over time. These factors may include the use of more ignition-resistant fabrics and filling materials (due in part to or accelerated by the adoption of voluntary and mandatory safety standards); reductions in smoking, and accompanying reductions in the use of small open-flame sources (e.g., lighters and matches); improvements in fire fighting methods, response times, and equipment; and increases in the use of smoke detectors and sprinklers.

The above data indicate that the injury, death, and property losses attributable to both cigarette-ignition and open-flame-ignition of upholstered furniture remain very large. Although significant reductions in fire losses associated with ignition of upholstered furniture have occurred in recent years, particularly in the area of cigarette-ignition, the opportunity to achieve substantial, further reductions remains. While this proceeding is limited to risks from open-flame ignitions, the Commission can reassess the scope of its inquiry if it determines that further action may be warranted.

F. Existing Standards

The Commission is aware of some existing standards that may be relevant to this proceeding. These standards are described below.

1. *California standards.* The Bureau of Home Furnishings & Thermal Insulation in California's Department of Consumer Affairs began developing upholstered furniture and mattress flammability standards in the early 1970's, at approximately the same time as federal government efforts were initiated. Three standards—Technical Bulletins 116, 117, and 133—apply to upholstered furniture offered for sale in California. These standards contain labeling requirements and performance tests to measure the resistance to cigarette and open-flame ignition of components (TB–117) and finished items (TB–116 for cigarettes and TB–133 for open flames). TB–117 is mandatory for all upholstered furniture offered for sale in California; TB–116 is a voluntary standard routinely used for compliance screening tests; and TB–133 is mandatory only for items of upholstered furniture intended for use in public occupancies (excluding residences) not protected by automatic sprinklers.

This proceeding is limited to small open-flame ignitions. Thus, it does not cover TB–116 or TB–133, which apply respectively to cigarette ignition and large open flames. The standard relevant to this proceeding, TB–117, measures flammability performance by char length, flame spread, or weight loss, when a lit cigarette or a small open flame is applied to test surfaces of filling components. Under TB–117, upholstery fabrics must also meet the flaming ignition requirements of the CPSC's general wearing apparel regulations, which are codified at 16 CFR part 1610. (Virtually all upholstery materials comply with this provision.) Fire retardant-treated foam—so-called "California Foam"—is used to meet TB–117. There is no California standard for small open flames incorporating a composite test for finished items or full-scale mockups.

2. *Other Standards.* The Upholstered Furniture Action Council ("UFAC") adopted, in 1978, a Voluntary Action Program and voluntary test method, which incorporates cigarette ignition tests for furniture components. In addition, ASTM, Inc.—formerly the American Society for Testing & Materials—and the National Fire Protection Association ("NFPA") have adopted elements of a previously-developed draft CPSC standard and the UFAC cigarette ignition test methods. Neither organization, however, has adopted standards for small open-flame ignitions, the subject of this ANPR.

Other existing standards include those promulgated in 1988 by the British government, known as the "Furniture and Furnishings (Fire) (Safety) Regulations 1988 (Amended 1989)." These regulations supplemented a 1980 cigarette ignition regulation by adding a series of open-flame performance requirements. In addition, the regulations essentially banned all polyurethane foams—other than highly ignition-resistant "combustion-modified" foams—for use as filling materials in residential upholstered furniture. The regulations apply to most used upholstered furniture manufactured after 1950 as well as to new items.

G. Regulatory Alternatives Under Consideration

The Commission will consider the following alternatives to reduce the number of injuries and deaths and the amount of property damage from fires associated with small open-flame ignition of upholstered furniture.

1. *Flammability Standard.* If the Commission finds that a standard is needed to adequately protect the public against an unreasonable risk of the occurrence of fire leading to death, injury, or significant property damage, it may promulgate a flammability standard. Any such standard would be stated in objective terms that are reasonable, technologically practicable, and appropriate. It would also be limited to such fabrics, related materials, or products which have been determined to present the unreasonable risk found to exist.

2. *Labeling Regulation.* Either separately or as part of a flammability standard, the Commission may consider issuance of a labeling regulation as part of this proceeding.

3. *Voluntary standards.* The Commission could terminate this proceeding and rely upon a voluntary standard submitted in response to this notice if the standard would likely result in the elimination or adequate reduction of the risk of injury identified in the notice, and if there would likely be substantial compliance with such standard.

H. Solicitation of Information and Comments

Based on information currently available to the Commission from investigations, research, and other sources, the Commission, in accordance with section 4(a) of the FFA, 15 U.S.C. 1193(a), finds that a new flammability standard, or other regulation, may be

needed for products of upholstered furniture made from fabrics and related materials, and for fabrics and related materials used in, or intended for use in upholstered furniture, to protect the public against the unreasonable risk of the occurrence of fire leading to death, personal injury, or significant property damage. The specific risk of the occurrence of fire is from the ignition of upholstered furniture from small open-flame sources.

This ANPR is the first step of a proceeding which could result in a mandatory flammability standard and/or labeling regulation, or a voluntary standard, for upholstered furniture that presents an unreasonable risk of the occurrence of fire leading to death or personal injury or significant property damage. To assist the Commission in reaching an informed decision in this matter, the Commission invites all interested persons to submit to the Commission their comments on any aspect of the alternatives discussed above. Specifically, in accordance with section 4(g) of the FFA, the Commission solicits:

(1) Written comments with respect to the risk of injury identified by the Commission, the regulatory alternatives being considered (including the potential effectiveness and economic impacts of such alternatives), and other possible alternatives for addressing the risk.

(2) Any existing standard or portion of a standard which could be issued as a proposed regulation.

(3) A statement of intention to modify or develop a voluntary standard to address the risk of injury discussed in this notice, along with a description of a plan to do so.

In addition, the Commission would like to receive from interested parties data on open-flame ignition tests of upholstered furniture.

Comments should be mailed, preferably in five (5) copies, to the Office of the Secretary, Consumer Product Safety Commission, Washington, D.C. 20207-0001, or delivered to the Office of the Secretary, Consumer Product Safety Commission, Room 502, 4330 East West Highway, Bethesda, Maryland 20814-4408; telephone (301) 504-0800. All comments and submissions should be received no later than August 15, 1994.

Dated: June 9, 1994.

Sadye E. Dunn,

Secretary, Consumer Product Safety Commission.

[FR Doc. 94-14573 Filed 6-14-94; 8:45 am]

BILLING CODE 6355-01-P

NATIONAL ASSOCIATION OF STATE FIRE MARSHALS

Executive Committee

October 5, 2001

The Honorable Ann Brown, Chairwoman
The Honorable Thomas Moore, Vice Chairman
The Honorable Mary Sheila Gall, Commissioner
US Consumer Product Safety Commission
Washington, *DC 20207-0001*

Dear Chairwoman Brown, Vice Chairman Moore and Commissioner Gall:

The National Association of State Fire Marshals (NASFM) withdraws its petition of March 31, 1993, in which it requested the Commission to adopt the upholstered furniture fire safety standard known as California Technical Bulletin 117 (TB 117), and respectfully requests the Commission to defer action on this important issue at this time. We fully intend to submit an amended petition in the near future.

We take this step for two reasons. First, the regulatory approach proposed by Commission staff fails to treat the upholstered furniture as a system because it focuses solely on preventing ignition of the fabric and ignores the possibility of fire spread if ignition were to occur. In a matter that has traditionally defied consensus, we find widespread agreement from a diverse range of fire safety experts that the Commission staff's proposed approach would be neither effective nor commercially feasible. Since accepting our petition, the Commission has not had the opportunity to vote in this matter. However, if the staff's approach were to be accepted as-is, it would likely result in costly protracted litigation -- and even without the litigation, the draft standard would have a limited impact on fire protection.

Second, the State of California soon will propose an updated version of TB 117 that reflects the current scientific understanding of these fires, and the materials now in use by industry. We understand that California will propose its updated standard in the next two quarters and then undergo round-robin validation of the test methodology and standards it has developed. The existing TB 117 is mandatory in California and forms the basis for a significant degree of voluntary national compliance. The new standard is likely to become the *de facto* national standard. Depending on the outcome of the round-robin tests, our amended petition is likely to request that the Commission adopt the new TB 117 nationally. However, since the work on California's revised standard has not yet been completed, we also have to leave open the possibility of pursuing other options.

1319 F Street, NW, Suite 301 ▮ Washington, DC 20004 ▮ Tel: (202) 737-1226 ▮ Fax: (202) 393-1296 ▮ www.firemarshals.org

We find it difficult to understand why the Commission staff has consumed so much time in addressing the relatively straightforward matter of upholstered furniture fires, which represent the single greatest hazard within its jurisdiction. According to the agency's own statistics, in the 7 years since our petition was granted more than 4,400 Americans have died in fires where upholstered furniture was the first item ignited. The national fire data do not reveal the lives lost where upholstered furniture was the second or third item ignited, turning small fires into large, deadly conflagrations.

The time that has lapsed has not been entirely unproductive. Approximately a year and a half were used by the National Academy of Sciences to investigate the health effects of flame-retardant chemicals that may be used to meet the Commission's proposed fire safety standard. This study demonstrated that industry has an adequate number of safe and effective options, and was an important contribution to the regulatory community. We will ask that similar investigations be made of all new fire safety technologies as they become available.

Although the continued loss of life and property remains unacceptable, we believe that a fresh start is justified, and will give the Commission's staff an opportunity to reassert what was once their unchallenged leadership in fire safety.

Sincerely,

George A. Miller
President

U.S. CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, DC 20207

Ronald L. Medford
Assistant Executive Director for Hazard Identification and Reduction
Office of Hazard Identification and Reduction

Tel: 301-504-0554
Fax: 301-504-0407
Email: rmedford@cpsc.gov

October 19, 2001

Mr. George A. Miller
President
National Association of State Fire Marshals
1319 F Street, NW
Suite 301
Washington, DC 20004

Dear Mr. Miller:

Chairman Brown has forwarded to me your letter withdrawing the National Association of State Fire Marshals' (NASFM) petition on upholstered furniture flammability. While I am disappointed in that decision, it of course does not restrict the Commission's future course of action. To the extent portions of the petition were already acted upon, the proceedings on them are complete. To the extent portions were deferred, the Commission is not constrained from taking whatever action it deems appropriate.

I was also disappointed to learn of your lack of support for the extensive technical work CPSC staff has undertaken to develop an effective draft standard. Contrary to your belief, CPSC staff has from the beginning focused on a systems approach to the small open flame upholstered furniture flammability hazard. In fact, from my conversations with a representative of NASFM, it appears that the only substantive difference of opinion regarding our approach and what NASFM prefers is a requirement for fire-retardant filling materials such as treated polyurethane foam. The staff has frequently explained its position on this issue -- that an additional requirement for treated foam is unnecessary given the performance requirements drafted by the staff.

While we agree that it has taken considerable time to develop our draft standard, no one has proposed a realistic alternative to the approach developed by the staff. Meanwhile, we have worked closely with the California Bureau of Home Furnishings & Thermal Insulation (BHF) in revising and upgrading their standard, TB-117. Their decision to upgrade the standard is in part a result of CPSC's work indicating that TB-117 does not adequately reduce the risk of small open flame fires. While BHF has not decided what acceptance criteria to incorporate, I expect

the upcoming proposal will be quite similar to CPSC's draft standard and will draw extensively on the work we have done.

Finally, you should be aware that the staff plans to forward a briefing package on upholstered furniture flammability to the Commission within the next few weeks

Sincerely,

Ronald L. Medford

Ronald L. Medford
Assistant Executive Director for
Hazard Identification and Reduction

cc: Ann Brown, Chairman
Thomas Moore, Commissioner
Mary Sheila Gall, Commissioner

TAB B

UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, DC 20207

Memorandum

Date: February 5, 2001

TO : Dale Ray, Project Manager, Upholstered Furniture
Directorate for Economic Analysis

THROUGH: Sue Ahmed, Ph.D., Associate Executive Director SA
Directorate for Epidemiology

Russ Roegner, Ph.D., Director RR
Division of Hazard Analysis

FROM : Kimberly Ault, Ph.D. KA
Mark S. Levenson, Ph.D. ML
Directorate for Epidemiology

SUBJECT : Upholstered Furniture Fire Loss Estimates 1980 - 1998

Recent Changes in CPSC's Upholstered Furniture Fire Loss Estimates

Recently, CPSC has published two documents containing fire loss estimates for upholstered furniture.

- **1998 Residential Fire Loss Estimates (Released March 26, 2001)**
  In this report, CPSC staff estimated that 10,200 fires, 520 deaths, 1,420 injuries, and $207.1 million in property damage were associated with upholstered furniture in 1998.

- **Upholstered Furniture Fire Loss Estimates, 1980 – 1998 (To be released)**
  In this report, CPSC staff estimated that 7,900 fires, 480 deaths, 1,080 injuries, and $190.8 million in property damage were associated with upholstered furniture in 1998.

The fire loss estimates for upholstered furniture presented in these two reports differ. Additionally, trend data presented in these reports differ from data in all previous CPSC reports relating to upholstered furniture for the following reasons:

1. CPSC staff revised an existing methodology for calculating the national fire loss estimates. Some of the revisions were made in response to recommendations made by the General Accounting Office in its November 1999 report "Consumer Product Safety Commission: Additional Steps Needed to Assess Fire Hazards of Upholstered Furniture". In this revised method, CPSC staff eliminated incendiary and suspicious fires, including arson fires (in order to reflect fire losses more likely to be addressable by CPSC actions). In addition, the procedure was revised to eliminate "unknown" estimates by re-allocating fires of unidentified product-specific codes within a known general product category (e.g. furniture). These two revisions to our methodology improve product-by-product comparisons and strengthen the staff's conclusions about product-related hazards. This is the methodology used in the report "1998 Residential Fire Loss Estimates".

2. After revising the overall national estimation methodology, CPSC developed an additional procedure to be used in data analyses supporting regulatory projects. For upholstered furniture, the procedure involved performing extensive data editing on the NFIRS database. The NFIRS database was evaluated to categorize incidents that were likely to be addressed by a small open flame standard for upholstered furniture. Within the NFIRS data base, some incidents were re-categorized from "upholstered furniture" to "not upholstered furniture" when it was believed that, because of inconsistencies in the reported area of fire origin and type of material ignited, upholstered furniture may not have been the first item ignited. This is the methodology used in the report "Upholstered Furniture Fire Loss Estimates, 1980 – 1998".

Upholstered Furniture Fire Loss Estimates 1980 – 1998

February 2001

Kimberly Ault, Ph.D.
Mark Levenson, Ph.D.
U.S. Consumer Product Safety Commission
Directorate for Epidemiology
Division of Hazard Analysis
4330 East West Highway, Room 604
Bethesda, MD 20814

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Executive Summary

- Fires involving ignitions of upholstered furniture constitute a major part of the U.S. residential fire problem. These fires killed more people in 1997 (the latest year for which comparable national estimates for other products are available) than did fires involving any other category of consumer products under CPSC jurisdiction (1).

- During 1998, about 9,400 residential fires involved ignitions of upholstered furniture that resulted in 480 deaths, 1,340 injuries, and $190.8 million in property damage. Of these fire losses, CPSC estimates 6,200 fires, 420 deaths, 1,080 injuries, and $119.6 million in property damage would be addressable by a small open flame standard for upholstered furniture. These estimates comprise losses from both small open flame and smoking material ignitions.

    - Small open flame ignition sources, including lighters, matches, and candles, accounted for 1,500 fires (or about 24 percent of the addressable upholstered furniture fires), 80 deaths (19%), 350 injuries (32%), and $32.3 million in property damage (27%).

    - Smoking material ignition sources, which include cigarettes, cigars, and pipes, accounted for 4,700 fires (76%), 340 deaths (81%), 730 injuries (68%), and $87.4 million in property damage (73%).

- Both small open flame and smoking material ignited upholstered furniture fires have declined significantly since 1980; however, there has been no statistically significant decline among small open flame-related fire deaths – the most important single hazard measure – as there has been among smoking material-related fire deaths.

- Children under the age of 15 and adults 65 years and older were over-represented in addressable deaths. In 1998, of the 420 addressable deaths, 140 were of victims under the age of 15 and 80 were victims 65 years or older. The under 15 age group accounted for 75% of the addressable deaths from fires started from small open flames, such as matches, candles, and cigarette lighters.

- A large majority of the addressable fire losses involving small open flames were attributed to child-play. In 1998, 1,010 of 1,500 fires and 60 of 80 deaths involving small open flames were from child-play incidents. In contrast, few of the addressable incidents involving smoking materials were attributed to child-play.

- The CPSC staff revised an existing methodology for calculating the national fire loss estimates presented in this report. Some of the revisions were made in response to recommendations made by the General Accounting Office in its November 1999 report "Consumer Product Safety Commission: Additional Steps Needed to Assess Fire Hazards of Upholstered Furniture". The revised method excludes incendiary and suspicious (arson) fire losses and excludes losses for which coded reported data were inconsistent or uncertain. This method yields very conservative estimates of addressable fire losses that are significantly lower than under the staff's previous approach.

Introduction

The fire losses presented in this report reflect a methodology designed specifically to estimate the national fire losses that may be addressable by a small open flame standard for upholstered furniture. The methodology was developed in response to recommendations made by the General Accounting Office in its November 1999 report "Consumer Product Safety Commission: Additional Steps Needed to Assess Fire Hazards of Upholstered Furniture". The revised method directly responds to the GAO concern for finding a more accurate method for estimating national fire losses that would be directly addressable by a small open flame standard for upholstered furniture. The revised method is a conservative approach that generally results in fire loss estimates that are lower than estimates produced from the previous methodology used by CPSC staff.

Data Sources

This report is based on the U.S. Fire Administration's National Fire Incident Reporting System (NFIRS) data and the National Fire Protection Association's (NFPA) annual survey of fire departments. The NFIRS is a voluntary system in which participating fire departments report detailed characteristics of fires to which they responded, such as the form of the first item to ignite, the type of material of the first item ignited, the area of the fire origin, whether some type of equipment was involved in the incident, and the potential cause of the fire (or ignition factor). Each year, approximately one third to one half of U.S. fire departments participate. In 1998, the latest year for which data are available, the NFIRS contained reports of 156,661 residential structure fires from 39 states and the District of Columbia that resulted in 1,229 civilian deaths, 7,379 civilian injuries, and over $1.837 billion in property loss. Although the system is not a random sample of fire departments, the NFIRS is believed to be reasonably representative of all fire departments in the U.S. The NFPA survey is based on a stratified random sample of fire departments in the U.S. The sample is stratified by the size of community protected by the department. The NFPA makes national projections by weighting sample results according to the proportion of total U.S. population accounted for by communities of each size. Appendix 1 presents NFIRS residential structure fire loss file counts for years 1980 to 1998. Appendix 2 presents NFPA annual estimates for residential structure fires, deaths, injuries, and property loss for years 1980 to 1998.

Methodology

The revised methodology has many steps that involve grouping the NFIRS database by specific variables, editing the NFIRS database, allocating unknown values, and projecting the NFIRS database to the national level by scaling or weighting the cases. The following sections explain the revised method in detail.

Grouping the NFIRS Database for Upholstered Furniture Fire Losses

Within the NFIRS database, all residential structure fire losses, excluding losses in hotels and motels, were grouped by form of heat of ignition and form of material ignited. Fire losses occurring in hotels and motels (NFPA's fixed property use code 44) were excluded. The losses associated with these property uses are small compared to other residential uses. The scope of a standard would probably not cover this type of upholstered furniture. Fire losses associated with incendiary and suspicious ignition factors were also excluded because these fire losses are less likely to be effectively addressed.

Appendix 3 shows the groupings using the NPFA 901 fire reporting codes. The categories used for form of material first ignited were upholstered furniture, not upholstered furniture, and unknown form of material ignited. The forms of heat ignition categories were smoking materials, small open flame sources, other heat sources, and unknown heat sources.

Editing the NFIRS Database

At the initial stage of the estimation procedure, the NFIRS database was evaluated to categorize incidents that were likely to be addressed by a small open flame standard for upholstered furniture. Within the NFIRS data base, some incidents were re-categorized from "upholstered furniture" to "not upholstered furniture" when it was believed that, because of inconsistencies in the reported area of fire origin and type of material ignited, upholstered furniture may not have been the first item ignited. For example, a fire that originated in a chimney or that ignited paper first was not considered an upholstered furniture fire even if upholstered furniture were reported as the item first ignited.

NFIRS incidents also were categorized among several levels of potential addressability based upon the fire characteristics reported. An "in-scope" or likely addressable fire was one in which the first item ignited was upholstered furniture, the type of material ignited was some type of fabric or other soft upholstery material that could be used on upholstered furniture, and the area of origin was consistent with a household location where a piece of upholstered furniture could be placed. A small open-flame standard would address performance requirements only for the fabric on the upholstered furniture, not the wood frame or other non-upholstery portions. Therefore, an example of an "out-of-scope" or non-addressable fire would be one in which upholstered furniture was reported as the first item to ignite but the type of material reported as igniting first was a material, such as "wood", that would indicate that the upholstery of the furniture was not the first portion to ignite. The editing/coding scheme (summarized in Table 1) is described as follows:

- Fire losses where the form of material ignited was reported as upholstered furniture and where "in-scope" values were reported (see Appendix 4) for type of material ignited, area of origin, ignition factor, and equipment involved in ignition were considered upholstered furniture fire losses addressable by the standard.

- Fire losses where the form of material ignited was reported as upholstered furniture and where "out-of-scope" values were reported for type of material ignited, area of origin, ignition factor, or equipment involved in ignition were considered to be upholstered furniture fire losses not addressable by the standard.

- Fire losses where the form of material ignited was reported as upholstered furniture and where values for type of material ignited, area of origin, ignition factor, or equipment involved in ignition were neither "in-scope" nor "out-of-scope" (possible coding errors) were considered not to be upholstered furniture fire losses. (For example, upholstered furniture was reported as the form of material ignited and paper was reported as the type of material ignited.)

- Fire losses where the form of material ignited was reported as unknown and where "in-scope" values were reported for type of material ignited, area of origin, ignition factor, and equipment involved in ignition were considered to be unknown form of material ignited fire losses. (For example, the form of material ignited was not reported, but the type of material ignited was consistent with a material used on upholstered furniture.)

- Fire losses where the form of material ignited was reported as unknown and where "out-of-scope" values were reported for type of material ignited, area of origin, ignition factor, or equipment involved in ignition were considered not to be upholstered furniture fire losses. (For example, the form of material ignited was not reported, and the type of material ignited was not consistent with a material used on upholstered furniture.)

Table 1 summarizes this coding scheme. As shown in Appendix 4, "in-scope" and "out-of-scope" values varied among different heat ignition categories.

Table 1
Grouping Decision Table

Form Of Material Ignited	Type Of Material Ignited	Area Of Origin	Ignition Factor	Equipment Involved	Coding Result
Upholstered Furniture	"In-Scope"	"In-Scope"	"In-Scope"	"In-Scope"	Addressable Upholstered Furniture
Upholstered Furniture	At Least One "Out-Of-Scope"				Not Addressable Upholstered Furniture
Upholstered Furniture	At Least One Neither "In-Scope" Nor "Out-Of-Scope"				Not Upholstered Furniture
Unknown	"In-Scope"	"In-Scope"	"In-Scope"	"In-Scope"	Unknown Form of Material Ignited
Unknown	At Least One "Out-Of-Scope"				Not Upholstered Furniture

Estimation Procedure and Allocation of Unknowns

National fire loss estimates were derived by computing percentages of the various NFIRS code groups described above, and multiplying these percentages by the total number of U.S. fires, deaths, injuries, or dollar loss estimated from the NFPA survey. Hall and Harwood (2) document this scaling procedure. The overall scaling procedure is unchanged from the CPSC staff's previous approach. Since a significant number of NFIRS cases contain unknown values for one or more of the variables of interest, an iterative mathematical procedure known as raking was used to allocate these unknown

values. The raking procedure adjusts a cross-tabulation of the data so that the resulting table, without unknowns, maintains the same proportional relationship (odds ratio) of the original cross-tabulation. Izrael, Hoaglin, and Battaglia (3) describe the raking procedure and provide the SAS (Statistical Analysis Software) code for the raking procedure.

Two applications of the raking procedure were applied to the NFIRS data. In the first application, the unknowns (NFPA 901 code 00 as shown in Appendix 3) for form of material ignited, form of heat of ignition, and ignition factor were allocated. In the second application, fire loss cases with some information available but not enough to identify the subcategory were allocated. Within the form of material and form of heat of ignition variables there are some cases where there was insufficient information to use a detailed code. In such situations, the codes used are of the form k0 (e.g. 10, 20, 30) and these codes mean that the form of material ignited or the form of heat of ignition was known at a general level, but not at a specific level. For example, the code for unknown type of furniture is 20. The cases in this category were allocated among all other furniture categories (codes 21 – 29) including upholstered furniture (code 21). The allocation of these "within level" cases was done similarly for form of heat of ignition categories described in Appendix 3.

Results

In addition to providing 1998 estimates, the CPSC revised methodology was applied to the prior years since 1980. The revised-method estimates are presented below and in the attached tables.

1998 Fire Loss Estimates

During 1998, about 9,400 residential fires involved ignitions of upholstered furniture that resulted in 480 deaths, 1,340 injuries, and $190.8 million in property damage. (See Table 1.) Of these fire losses, **CPSC estimates that 6,200 fires, 420 deaths, 1,080 injuries, and $119.6 million in property damage would be addressable by the draft small open flame standard.** Of the addressable fire losses, smoking material ignition sources, which include cigarettes, cigars, and pipes, accounted for 4,700 fires (or about 76 percent of the addressable upholstered furniture fires), 340 deaths (81%), 730 injuries (68%), and $87.4 million in property damage (73%). Small open flame ignition sources, including lighters, matches, and candles, accounted for 1,500 fires (24%), 80 deaths (19%), 350 injuries (32%), and $32.2 million in property damage (27%).

Other heat sources potentially addressed by the small open flame standard, including sparks, embers, or flames escaping from fueled equipment, arcs or sparks from electrical equipment, small torches, hot embers, and fireworks, accounted for 300 fires, 20 injuries, and $5.9 million in property damage. These fire losses are **not** included in the addressable totals cited above.

Table 2
1998 Upholstered Furniture Fire Loss Estimates

1998 Fire Losses	Fires	Deaths	Injuries	Property Loss in Millions
Total Upholstered Furniture	**9,400**	**480**	**1,340**	**$190.8**
Total Addressable Fire Losses	**6,200**	**420**	**1,080**	**$119.6**
Smoking Material – Addressable	**4,700**	**340**	**730**	**$87.4**
Smoking Material – Not Addressable	200	*	10	$2.3
Small Open Flame – Addressable	**1,500**	**80**	**350**	**$32.2**
Small Open Flame - Not Addressable	100	*	10	$1.2
Other Small Open Flame Sources – Potentially Addressable	300	*	20	$5.9
Other Small Open Flame Sources - Not Addressable	**	0	0	$0.3
Other Heat Sources – Not Addressable	2,700	50	220	$61.3

Source: U.S. Consumer Product Safety Commission / EPHA, U.S. Fire Administration's National Fire Incident Reporting System, and National Fire Protection Association's annual survey of fire departments.
Note: Detail may not add to total due to rounding. Estimated fires are rounded to the nearest 100. Estimated deaths and injuries are estimated to the nearest 10. Estimated fires less than 50 are denoted by a double asterisk and estimated deaths less than five are denoted by a single asterisk.

Trend Analysis – Upholstered Furniture Fires Losses from 1980 to 1998

Tables 3 - 6 show **addressable** upholstered furniture fire loss estimates by the various heat ignition sources from 1980 to 1998. The tables include estimates for both the two addressable categories shown in Table 2 above. Tables 7 - 10 show **total** upholstered furniture fire loss estimates by the various heat ignition sources.

Fires involving ignitions of upholstered furniture continue to constitute a major part of the U.S. residential fire problem. These fires killed more people in 1998 (the latest year for which data are available) than did fires involving any other category of consumer products. Since the early 1980's, fires, fire deaths, and fire injuries associated with upholstered furniture decreased substantially. Smoking material fires accounted for the vast majority of this decrease; these fires declined by 79% from 1980 to 1998. Small open flame ignited fires have also declined, but not at the same rate (42%). A regression analysis showed a significant decrease ($p < 0.05$) in both smoking material and small open flame estimated fires between 1980 and 1998. Figure 1 shows fires associated with smoking materials and small open flame ignitions of upholstered furniture from 1980 to 1998. Figure 2 shows deaths associated with smoking materials and small open flame ignitions of upholstered furniture from 1980 to 1998. A regression analysis showed no significant decrease ($p > 0.05$) in the estimated numbers of small open flame deaths associated with upholstered furniture. Thus, the declining trend in the estimated numbers of small open flame fires has not been accompanied by a decline in deaths.

Fire Casualties by Age Group

Casualty estimates (deaths and injuries) of four age groups were calculated. The age groups considered are under 5 years old, 5 to 14 years old, 15 to 64 years old, and 65 years and older. For comparison, the percentage of the U.S. populations in each of the four age groups is given in Table 11 (4). The raking procedure discussed in the methodology section above was modified in order to ensure that the marginal totals match the casualty estimates without the age group breakdown. The estimates of deaths for 1998 and for the yearly average of the five-year period from 1994 to 1998 are given in Tables 12 and 13. The corresponding injury estimates are given in Tables 14 and 15.

Of the 420 addressable deaths in 1998, 80 were victims under the age of five, 60 were victims between the ages of 5 and 14, 200 were victims between the ages of 15 and 64, and 80 victims were 65 years or older. For the five-year average, 100 of the yearly average of 500 addressable deaths were victims under 5, 60 were victims between the ages of 5 and 14, 200 were victims between the ages of 15 and 64,and 140 victims were 65 years or older. The difference between the 1998 and the five-year average for victims 65 years or older is mainly due to smoking materials, which in 1998 was much lower than for any of the years from 1994 to 1997.

The comparison of the death estimates with the U.S. population demonstrates the uneven distribution of deaths across the four age groups. Twenty-two percent of the U.S. population is under 15, yet 32% of the addressable fire deaths in the period from 1994 to 1998 were in this age range. The biggest disparity for this age group is in the small open flame category. Eighty-six percent of such deaths in the period were in the under-15 age group. For the under-5 age group, the situation is extreme. Fifty-seven percent of the deaths in the small open flame category are of children under five, although they make up only 7% of the population. As for the 65-years-and-older age group, which represents 13% of the U.S. population, 28% of the addressable deaths were in this age group during the period.

Injuries follow a pattern similar to that for deaths. Of the 1,080 addressable injuries in 1998, 190 were victims under the age of 5, 110 were victims between the ages of 5 and 14, 690 were victims between the ages of 15 and 64, and 100 victims were 65 years or older. For the five-year average, 190 of the yearly average of 1,200 addressable injuries were victims under 5, 130 were victims between the ages of 5 and 14, 690 were victims between the ages of 15 and 64, and 200 victims were 65 years or older.

The disparity between the injury estimates for the four age groups and the corresponding U.S. population percentages is less extreme than in the case of deaths. The 22% of the U.S. population under 15 had 26% of the addressable injuries and the 13% of the U.S. population 65 years and older had 17% of the addressable injuries in the years from 1994 to 1998.

Fire Loss Estimates from Child-Play Incidents

The NFIRS database allows for the identification of the fire incidents that were initiated by children. Tables 16 to 19 provide fire loss estimates associated with these "child-play" incidents for 1994 through 1998 and for the five-year average. The fire loss estimates for child-play incidents can be compared to those in Tables 3 to 6, which provide comparable estimates for all addressable incidents. The use of the raking procedure in the allocation of unknowns results in small discrepancies between the child-play estimates and the estimates for all addressable incidents.

In 1998, child-play incidents accounted for 1,070 of the 6,200 addressable fires, 60 of the 420 addressable deaths, 250 of the 1,080 addressable injuries, and $22.7 million of the $119.6 million in addressable property loss.

Child-play incidents make up only a small share of the addressable losses involving smoking materials. In 1998, there were 70 fires, no deaths, 20 injuries, and $0.6 million in property loss from child-play incidents involving smoking materials. The figures for all addressable incidents involving smoking materials are 4,700 fires, 340 deaths, 730 injuries, and $87.4 million in property loss.

The opposite case is seen for incidents involving small open flames. Child-play accounts for a large percentage of incidents involving small open flames. In 1998, there were 1,010 fires, 60 deaths, 230 injuries, and $22.1 million in property loss from child-play incidents involving small open flames. The comparable figures for all addressable incidents involving small open flames are 1,500 fires, 80 deaths, 350 injuries, and $32.2 million in property loss.

Discussion

The methodology used in this report for estimating upholstered furniture fire losses yields a conservative approach to describing the size of the fire problem that a small open-flame standard for upholstered furniture would address for the following reasons:

- First, the exclusion of incendiary and suspicious fire losses implies that these fires are considered less promising candidates for reduction via a standard.

- Second, the decision to exclude cases with apparently inconsistent coding on data elements other than form of material ignited (i.e. identified as upholstered furniture) assumes there is a coding error and the error is in the coding of the area of origin or type of material first ignited, not in the form of material ignited.

- Third, this editing process is one-sided, as it does not consider the possibility of other mis-codings where upholstered furniture fires may have been erroneously coded as something else.

The methodology used in this report differs from the methodology used in CPSC staff's annual report on residential fire losses (Mah, Smith & Ault, 2000) and from all previous reports containing national fire estimates. The steps described earlier for grouping upholstered furniture fire losses, editing the NFIRS database, and for allocation of unknowns were used in the estimates presented in this report. The methodology used in the annual report of fire losses involved making national estimates for many product categories and therefore did not involve extensive data editing.

Table 3

Addressable Upholstered Furniture Fires by Form of Heat of Ignition, 1980 - 1998

Year	Total Addressable Upholstered Furniture	Smoking Materials	Small Open Flames
1980	25,200	22,600	2,600
1981	22,900	20,600	2,300
1982	18,300	16,300	2,000
1983	15,300	13,400	1,900
1984	15,300	13,200	2,100
1985	14,100	12,100	2,000
1986	13,500	11,700	1,800
1987	12,500	10,700	1,800
1988	12,000	10,300	1,700
1989	10,500	8,900	1,600
1990	9,200	8,000	1,200
1991	8,900	7,600	1,300
1992	8,400	6,700	1,700
1993	7,800	6,300	1,500
1994	7,500	5,800	1,700
1995	7,300	5,800	1,500
1996	6,600	5,200	1,400
1997	6,500	5,000	1,500
1998	6,200	4,700	1,500

Source: U.S. Consumer Product Safety Commission / EPHA, U.S. Fire Administration's National Fire Incident Reporting System, and National Fire Protection Association's annual survey of fire departments.

Note: Detail may not add to total due to rounding. Estimated fires are rounded to the nearest 100.

Table 4

Addressable Upholstered Furniture Fire Deaths by Form of Heat of Ignition, 1980 - 1998

Year	Total Addressable Upholstered Furniture	Smoking Materials	Small Open Flames
1980	1,260	1,150	110
1981	1,190	1,130	60
1982	1,050	990	60
1983	1,030	880	150
1984	880	800	80
1985	770	730	40
1986	930	820	110
1987	800	690	110
1988	860	760	100
1989	720	650	70
1990	650	570	80
1991	560	440	120
1992	560	490	70
1993	490	430	60
1994	540	420	120
1995	540	490	50
1996	510	470	40
1997	520	470	50
1998	420	340	80

Source: U.S. Consumer Product Safety Commission / EPHA, U.S. Fire Administration's National Fire Incident Reporting System, and National Fire Protection Association's annual survey of fire departments.

Note: Detail may not add to total due to rounding. Estimated deaths are rounded to the nearest 10. Death estimates less than five but greater than zero are denoted by an asterisk.

Table 5

Addressable Upholstered Furniture Fire Injuries by Form of Heat of Ignition, 1980 - 1998

Year	Total Addressable Upholstered Furniture	Smoking Materials	Small Open Flames
1980	2,400	2,030	370
1981	2,240	1,930	310
1982	2,040	1,740	300
1983	2,100	1,780	320
1984	2,010	1,610	400
1985	1,710	1,400	310
1986	1,690	1,320	370
1987	1,700	1,350	350
1988	1,740	1,400	340
1989	1,470	1,160	310
1990	1,540	1,200	340
1991	1,450	1,050	400
1992	1,180	840	340
1993	1,380	1,030	350
1994	1,280	910	370
1995	1,210	830	380
1996	1,250	920	330
1997	1,180	740	440
1998	1,080	730	350

Source: U.S. Consumer Product Safety Commission / EPHA, U.S. Fire Administration's National Fire Incident Reporting System, and National Fire Protection Association's annual survey of fire departments.

Note: Detail may not add to total due to rounding. Estimated injuries are rounded to the nearest 10.

Table 6

Addressable Upholstered Furniture Fire Property Loss in Millions by Form of Heat of Ignition, 1980 - 1998

Year	Total Addressable Upholstered Furniture	Smoking Materials	Small Open Flames
1980	$131.6	$124.2	$7.4
1981	$162.7	$151.9	$10.8
1982	$191.3	$180.1	$11.2
1983	$115.8	$104.2	$11.6
1984	$130.0	$116.5	$13.5
1985	$133.3	$117.0	$16.3
1986	$130.5	$115.6	$14.9
1987	$115.9	$84.8	$31.1
1988	$125.2	$107.8	$17.4
1989	$113.8	$98.9	$14.9
1990	$150.6	$134.8	$15.8
1991	$147.1	$123.3	$23.8
1992	$91.5	$69.6	$21.9
1993	$122.0	$95.5	$26.5
1994	$115.7	$89.2	$26.5
1995	$128.1	$99.8	$28.3
1996	$118.0	$84.0	$34.0
1997	$126.9	$90.7	$36.2
1998	$119.6	$87.4	$32.2

Source: U.S. Consumer Product Safety Commission / EPHA, U.S. Fire Administration's National Fire Incident Reporting System, and National Fire Protection Association's annual survey of fire departments.

Note: Detail may not add to total due to rounding.

Table 7

Total Upholstered Furniture Fires by Form of Heat of Ignition, 1980 - 1998

Year	Total Upholstered Furniture	Smoking Materials	Small Open Flame Fires	Additional Small Open Flame Sources	Other Heat Source Fires
1980	31,600	23,000	2,600	900	5,200
1981	28,800	21,000	2,400	700	4,700
1982	23,200	16,400	2,100	600	4,100
1983	20,300	13,700	2,000	700	4,000
1984	20,200	13,500	2,200	600	3,900
1985	19,100	12,300	2,100	600	4,100
1986	18,300	11,900	1,900	600	3,800
1987	16,900	10,900	1,900	500	3,600
1988	16,400	10,400	1,800	500	3,600
1989	14,800	9,000	1,700	500	3,600
1990	13,100	8,100	1,300	400	3,300
1991	13,000	7,700	1,400	400	3,500
1992	12,200	6,800	1,800	400	3,200
1993	11,500	6,400	1,600	400	3,100
1994	11,000	5,900	1,700	400	2,900
1995	10,600	5,900	1,600	400	2,800
1996	10,100	5,400	1,500	400	2,900
1997	9,500	5,100	1,500	300	2,600
1998	9,400	4,900	1,600	300	2,700

Source: U.S. Consumer Product Safety Commission / EPHA, U.S. Fire Administration's National Fire Incident Reporting System, and National Fire Protection Association's annual survey of fire departments.

Note: Detail may not add to total due to rounding. Estimated fires are rounded to the nearest 100.

Table 8

Total Upholstered Furniture Fire Deaths by Form of Heat of Ignition, 1980 - 1998

Year	Total Upholstered Furniture	Smoking Materials	Small Open Flame Fires	Additional Small Open Flame Sources	Other Heat Source Fires
1980	1,330	1,180	110	10	30
1981	1,400	1,170	70	60	110
1982	1,150	1,000	70	30	60
1983	1,080	900	150	0	30
1984	1,030	820	80	30	100
1985	880	740	50	10	80
1986	1,070	820	110	*	140
1987	970	700	110	30	130
1988	960	770	100	10	90
1989	830	670	70	10	80
1990	790	580	80	20	110
1991	640	460	120	20	50
1992	640	490	70	*	70
1993	610	440	60	10	100
1994	650	420	130	20	80
1995	640	500	50	20	60
1996	620	490	40	0	90
1997	620	470	50	20	80
1998	480	340	80	*	50

Source: U.S. Consumer Product Safety Commission / EPHA, U.S. Fire Administration's National Fire Incident Reporting System, and National Fire Protection Association's annual survey of fire departments.

Note: Detail may not add to total due to rounding. Estimated deaths are rounded to the nearest 10. Death estimates less than five but greater than zero are denoted by an asterisk.

Table 9

Total Upholstered Furniture Fire Injuries by Form of Heat of Ignition, 1980 - 1998

Year	Total Upholstered Furniture	Smoking Materials	Small Open Flame Fires	Additional Small Open Flame Sources	Other Heat Source Fires
1980	2,820	2,100	380	50	280
1981	2,560	1,970	340	40	210
1982	2,440	1,750	320	30	340
1983	2,530	1,800	330	60	340
1984	2,420	1,620	430	30	340
1985	2,130	1,420	340	30	340
1986	2,050	1,360	390	50	270
1987	1,990	1,360	350	40	240
1988	2,070	1,410	340	80	240
1989	1,920	1,170	330	90	330
1990	1,820	1,210	340	50	220
1991	1,810	1,070	410	70	250
1992	1,490	840	370	20	260
1993	1,800	1,050	350	20	380
1994	1,550	930	380	30	210
1995	1,680	840	380	70	390
1996	1,510	940	330	30	210
1997	1,390	750	450	30	160
1998	1,340	740	360	20	220

Source: U.S. Consumer Product Safety Commission / EPHA, U.S. Fire Administration's National Fire Incident Reporting System, and National Fire Protection Association's annual survey of fire departments.

Note: Detail may not add to total due to rounding. Estimated injuries are rounded to the nearest 10.

Table 10

Total Upholstered Furniture Fire Property Loss in Millions by Form of Heat of Ignition, 1980 - 1998

Year	Total Upholstered Furniture	Smoking Materials	Small Open Flame Fires	Additional Small Open Flame Sources	Other Heat Source Fires
1980	$186.9	$127.1	$7.5	$6.5	$45.9
1981	$215.3	$155.5	$12.1	$7.2	$40.5
1982	$234.9	$182.0	$11.6	$11.2	$30.1
1983	$166.9	$107.0	$11.9	$7.5	$40.5
1984	$177.4	$119.6	$14.3	$5.4	$38.1
1985	$188.8	$118.6	$16.9	$4.9	$48.4
1986	$190.4	$118.2	$15.3	$7.8	$49.1
1987	$155.8	$88.2	$32.1	$4.6	$31.0
1988	$178.3	$109.0	$17.8	$5.5	$46.1
1989	$183.6	$100.5	$16.9	$10.6	$55.7
1990	$211.8	$135.7	$17.0	$6.3	$52.7
1991	$230.9	$126.3	$25.4	$9.3	$69.9
1992	$156.2	$70.2	$22.9	$5.3	$57.8
1993	$182.2	$96.2	$27.4	$4.5	$54.1
1994	$174.9	$92.5	$27.8	$5.3	$49.3
1995	$198.1	$102.2	$29.8	$6.7	$59.3
1996	$188.4	$88.8	$35.4	$7.4	$56.8
1997	$182.4	$92.4	$37.6	$5.8	$46.5
1998	$190.8	$89.7	$33.5	$6.2	$61.3

Source: U.S. Consumer Product Safety Commission / EPHA, U.S. Fire Administration's National Fire Incident Reporting System, and National Fire Protection Association's annual survey of fire departments.

Note: *Detail may not add to total due to rounding. Estimated injuries are rounded to the nearest 10.*

Table 11
Percentage of U.S. Population by Age

	Age				
	Under 5	5 to 14	15 to 64	65 and Over	Total
Percentage of U.S. Population	7.2%	14.5%	65.6%	12.7%	100.0%

Source: The U.S. population Census estimates (4).

Table 12
1998 Upholstered Furniture Fire Deaths by Age

Form of Heat of Ignition	Age				
	Under 5	5 to 14	15 to 64	65 and Over	Total
Smoking Materials	60	20	190	70	340
Small Open Flames	20	40	10	10	80
Other Small Open Flames	0	0	0	*	*
Not Addressable	20	*	10	20	60
Total Addressable	**80**	**60**	**200**	**80**	**420**
Total	100	60	210	100	480

Source: U.S. Consumer Product Safety Commission / EPHA, U.S. Fire Administration's National Fire Incident Reporting System, and National Fire Protection Association's annual survey of fire departments.
Note: Total addressable is the sum of Smoking Materials and Small Open Flames. Estimates are rounded to the nearest 10. *Estimates less than five but greater than zero are denoted by an asterisk. Details may not add to total due to rounding.*

Table 13
1994-1998 Annual Average Upholstered Furniture Fire Deaths by Age

Form of Heat of Ignition	Age				
	Under 5	5 to 14	15 to 64	65 and Over	Total
Smoking Materials	60	40	190	140	430
Small Open Flames	40	20	10	*	70
Other Small Open Flames	*	*	10	*	10
Not Addressable	30	20	10	20	80
Total Addressable	**100**	**60**	**200**	**140**	**500**
Total	130	90	220	170	600

Source: U.S. Consumer Product Safety Commission / EPHA, U.S. Fire Administration's National Fire Incident Reporting System, and National Fire Protection Association's annual survey of fire departments.
Note: Total addressable is the sum of Smoking Materials and Small Open Flames. Estimates are rounded to the nearest 10. Estimates less than five but greater than zero are denoted by an asterisk. Details may not add to total due to rounding.

Table 14
1998 Upholstered Furniture Fire Injuries by Age

Form of Heat of Ignition	Age				
	Under 5	*5 to 14*	*15 to 64*	*65 and Over*	*Total*
Smoking Materials	50	60	520	100	730
Small Open Flames	130	50	170	0	350
Other Small Open Flames	0	10	10	0	20
Not Addressable	60	30	130	20	240
Total Addressable	**190**	**110**	**690**	**100**	**1,080**
Total	250	150	830	120	1,340

Source: U.S. Consumer Product Safety Commission / EPHA, U.S. Fire Administration's National Fire Incident Reporting System, and National Fire Protection Association's annual survey of fire departments..
Note: Total addressable is the sum of Smoking Materials and Small Open Flames. Estimates are rounded to the nearest 10. Estimates less than five but greater than zero are denoted by an asterisk. Details may not add to total due to rounding.

Table 15
1994-1998 Annual Average Upholstered Furniture Fire Injuries by Age

Form of Heat of Ignition	Age				
	Under 5	5 to 14	15 to 64	65 and Over	Total
Smoking Materials	50	70	520	180	820
Small Open Flames	130	60	160	20	370
Other Small Open Flames	*	10	10	*	30
Not Addressable	40	30	120	50	240
Total Addressable	**190**	**130**	**690**	**200**	**1,200**
Total	230	170	810	250	1,470

Source: U.S. Consumer Product Safety Commission / EPHA, U.S. Fire Administration's National Fire Incident Reporting System, and National Fire Protection Association's annual survey of fire departments.
Note: Total addressable is the sum of Smoking Materials and Small Open Flames. Estimates are rounded to the nearest 10. Estimates less than five but greater than zero are denoted by an asterisk. Details may not add to total due to rounding.

Table 16
Upholstered Furniture Fires from Child-Play Incidents, 1994 - 1998

Year	Smoking Materials	Small Open Flames	Other Small Open Flames	Not Addressable	Total Addressable	Total
1994	90	1,500	80	150	1,590	1,820
1995	50	1,330	40	120	1,390	1,550
1996	50	1,150	60	110	1,200	1,370
1997	50	1,170	60	100	1,230	1,390
1998	70	1,010	50	160	1,070	1,290
Mean	60	1,230	60	130	1,300	1,480

Source: U.S. Consumer Product Safety Commission / EPHA, U.S. Fire Administration's National Fire Incident Reporting System, and National Fire Protection Association's annual survey of fire departments.
Note: Total addressable is the sum of Smoking Materials and Small Open Flames. Estimates are rounded to the nearest 10. Details may not add to total due to rounding.

Table 17
Upholstered Furniture Fire Deaths from Child-Play Incidents, 1994 – 1998

Year	Smoking Materials	Small Open Flames	Other Small Open Flames	Not Addressable	Total Addressable	Total
1994	0	100	0	10	100	100
1995	0	50[1]	0	0	70	70
1996	0	20	0	0	20	20
1997	0	50	10	0	50	60
1998	0	60	0	10	60	70
Mean	0	60	*	*	60	60

Source: U.S. Consumer Product Safety Commission / EPHA, U.S. Fire Administration's National Fire Incident Reporting System, and National Fire Protection Association's annual survey of fire departments.
Note: Total addressable is the sum of Smoking Materials and Small Open Flames. Estimates are rounded to the nearest 10. Estimates less than five but greater than zero are indicated by an asterisk. Details may not add to total due to rounding. [1]The estimate for all incidents is given for this value, because the use of the raking procedure resulted in the estimate of child-play incidents being somewhat larger than the corresponding estimate for all incidents.

Table 18
Upholstered Furniture Fire Injuries from Child-Play Incidents, 1994 – 1998

Year	Smoking Materials	Small Open Flames	Other Small Open Flames	Not Addressable	Total Addressable	Total
1994	10	300	10	10	300	330
1995	0	310	*	20	310	330
1996	0	250	*	10	250	260
1997	0	310	20	20	310	350
1998	20	230	*	10	250	260
Mean	10	280	10	10	280	300

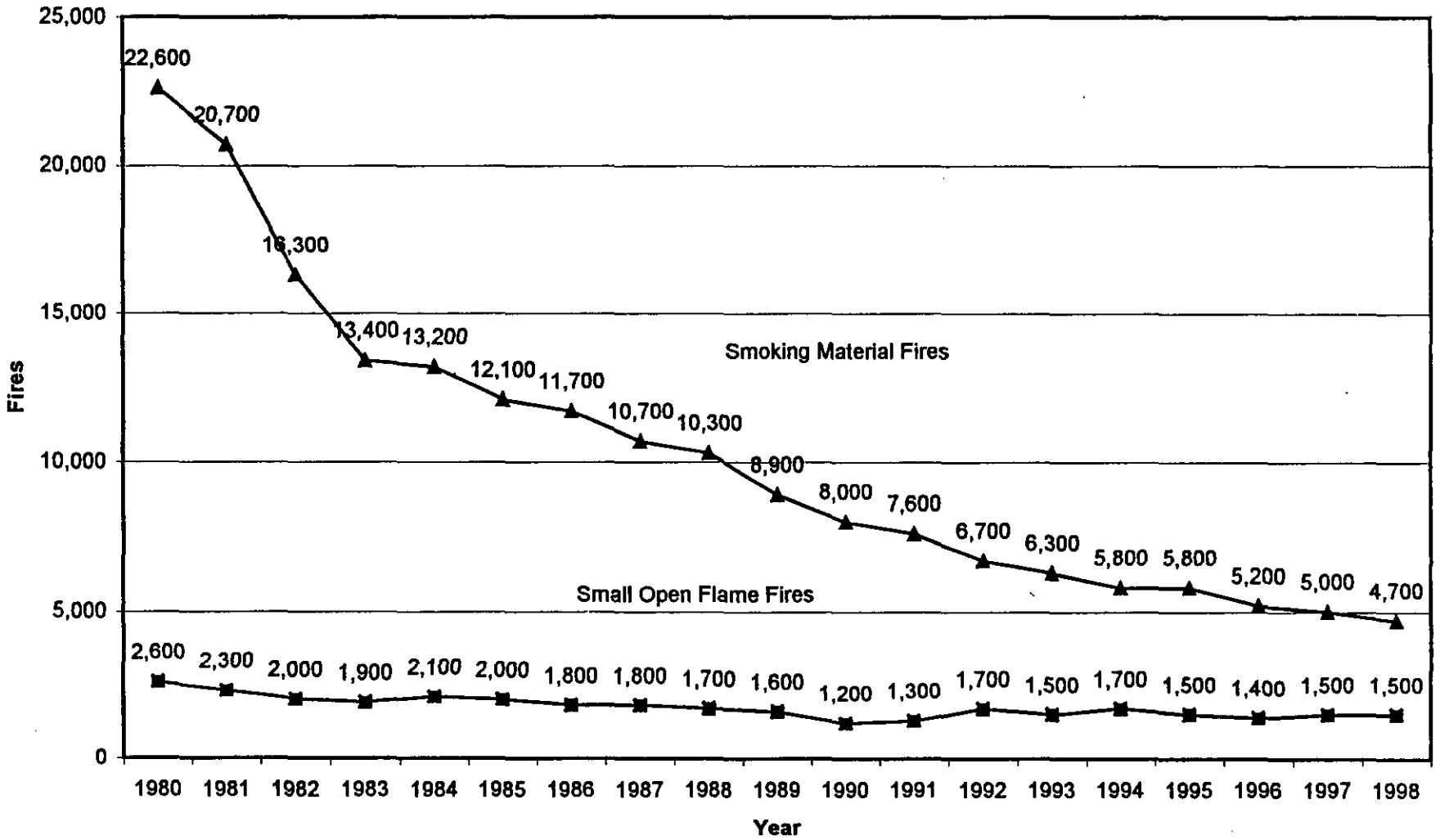
Source: U.S. Consumer Product Safety Commission / EPHA, U.S. Fire Administration's National Fire Incident Reporting System, and National Fire Protection Association's annual survey of fire departments.
Note: Total addressable is the sum of Smoking Materials and Small Open Flames. Estimates are rounded to the nearest 10. Estimates less than five but greater than zero are indicated by an asterisk. Details may not add to total due to rounding.

Table 19
Upholstered Furniture Fire Property Loss in Millions
From Child-Play Incidents, 1994 – 1998

Year	Smoking Materials	Small Open Flames	Other Small Open Flames	Not Addressable	Total Addressable	Total
1994	$0.7	$26.5[1]	$0.2	$2.0	$28.7	$30.9
1995	$0.8	$28.1	$1.0	$1.3	$28.9	$31.2
1996	$0.5	$26.8	$0.9	$2.9	$27.3	$31.1
1997	$0.1	$29.9	$0.9	$1.1	$30.0	$32.0
1998	$0.6	$22.1	$0.7	$3.0	$22.7	$26.5
Mean	$0.5	$27.0	$0.7	$2.1	$27.5	$30.3

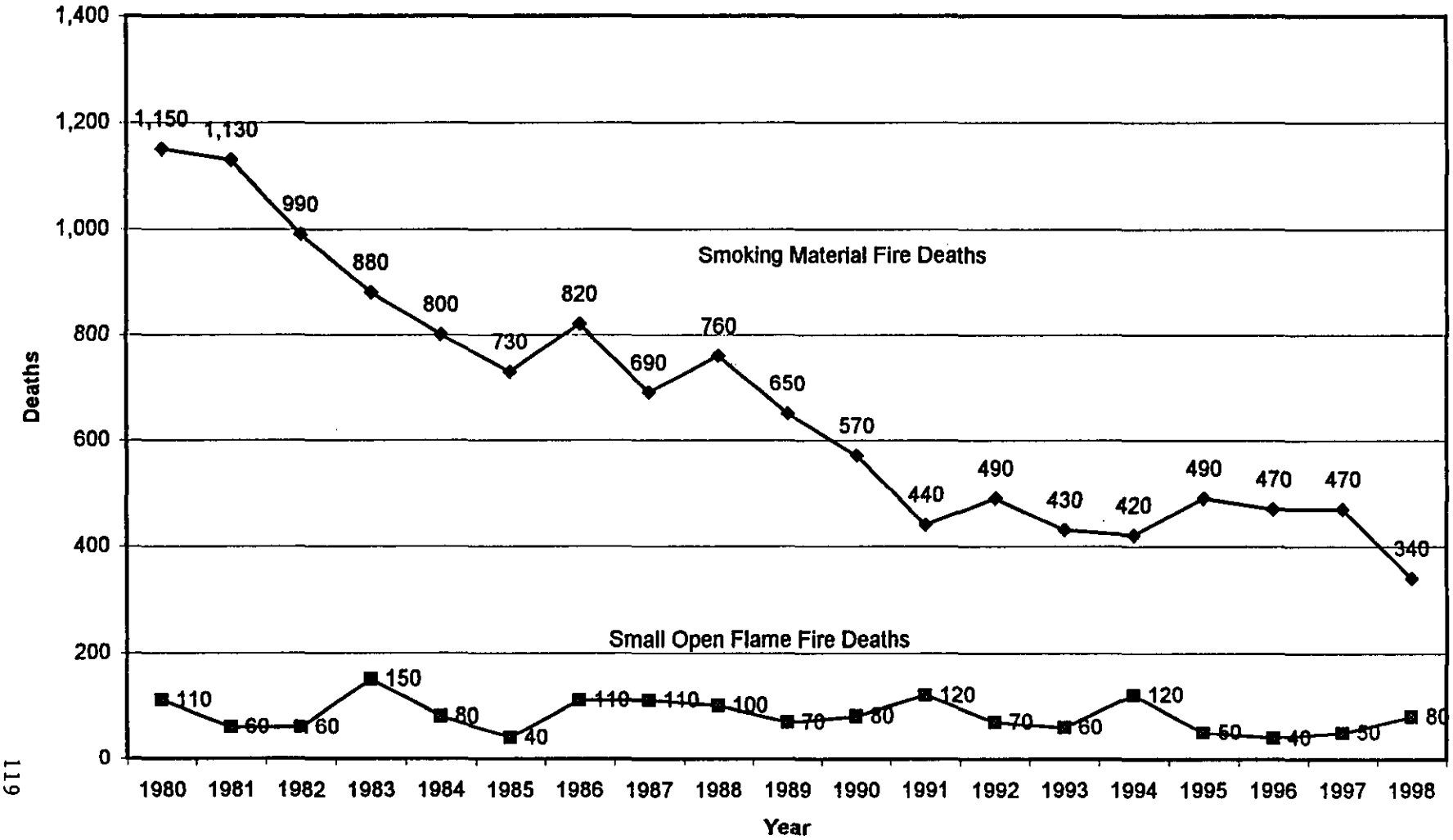
Source: U.S. Consumer Product Safety Commission / EPHA, U.S. Fire Administration's National Fire Incident Reporting System, and National Fire Protection Association's annual survey of fire departments.
Note: Total addressable is the sum of Smoking Materials and Small Open Flames. Details may not add to total due to rounding. [1]The estimate for all incidents is given for this value, because the use of the raking procedure resulted in the estimate of child-play incidents being somewhat larger than the corresponding estimate for all incidents.

Figure 1
Smoking Material and Small Open Flame Upholstered Furniture Fires, 1980 -1998



Source: U.S. Consumer Product Safety Commission / EPHA, *U.S. Fire Administration's National Fire Incident Reporting System, and* National Fire Protection Association's annual survey of fire departments.

Figure 2
Smoking Material and Small Open Flame Upholstered Furniture Fire Deaths, 1980 -1998



Source: U.S. Consumer Product Safety Commission / EPHA, U.S. Fire Administration's National Fire Incident Reporting System, and National Fire Protection Association's annual survey of fire departments.

Appendix 1
U.S. Fire Administration's National Fire Incident Reporting System
Residential Structure and Civilian Death and Injury File Counts

Year	Fires	Deaths	Injuries	Property Loss In Millions
1980	130,301	1,127	5,410	$696.9
1981	156,314	1,272	6,582	$829.0
1982	179,342	1,535	7,415	$1,179.7
1983	202,597	1,656	8,554	$1,243.1
1984	216,645	1,850	9,172	$1,420.4
1985	235,333	1,887	9,949	$1,701.7
1986	220,049	2,018	10,059	$1,577.9
1987	223,906	1,906	10,292	$1,961.3
1988	228,497	1,905	10,471	$1,935.6
1989	218,310	1,860	10,262	$1,909.2
1990	212,007	1,838	10,372	$1,996.8
1991	216,979	1,778	10,807	$2,043.7
1992	210,470	1,734	11,290	$2,197.3
1993	209,411	1,630	10,806	$2,194.9
1994	198.298	1,748	10,413	$1,945.5
1995	185,802	1,453	9,638	$1,915.2
1996	191,729	1,503	9,401	$2,110.5
1997	157,137	1,156	7,508	$1,750.8
1998	156,661	1,229	7,379	$1,836.6

Source: U.S. Fire Administration's National Fire Incident Reporting System, 1980 - 1998.

Appendix 2
National Fire Protection Association's Annual Estimates for Residential Structure Fires and Civilian Death and Injuries

Year	Fires	Deaths	Injuries	Property Loss in Millions
1980	757,500	5,446	21,100	$3,042
1981	733,000	5,540	20,375	$3,259
1982	676,500	4,940	21,100	$3,253
1983	641,500	4,820	21,450	$3,306
1984	623,000	4,240	19,275	$3,440
1985	622,000	5,025	19,825	$3,774
1986	581,500	4,770	19,025	$3,556
1987	551,500	4,660	20,440	$3,699
1988	552,500	5,065	22,600	$4,020
1989	513,500	4,435	20,750	$3,998
1990	467,000	4,115	20,650	$4,253
1991	478,000	3,575	21,850	$5,552
1992	472,000	3,765	21,600	$3,880
1993	470,000	3,825	22,600	$4,843
1994	451,000	3,465	20,025	$4,317
1995	425,500	3,695	19,125	$4,363
1996	428,000	4,080	19,300	$4,962
1997	406,500	3,390	17,775	$4,585
1998	381,500	3,250	17,175	$4,391

Source: National Fire Protection Association's annual survey of fire departments, 1980 - 1998.

Appendix 3
NFPA 901 Standard Codes Used in Upholstered Furniture Fire Loss Estimates

Form of Heat of Ignition	NFPA 901 Standard Codes
Smoking Materials	Cigarettes (31) Cigars (32) Pipes (33) Unknown smoking materials (30, 39)
Small Open Flame Sources	Candles (44) Matches (45) Lighters (46)
Additional Small Open Flame Sources Potentially Addressable	Spark, ember, flame escaping from gas fueled equipment (11) Spark, ember, flame escaping from liquid fueled equipment (13) Spark, ember, flame escaping from solid fueled equipment (15) Spark, ember, flame escaping from equipment, fuel not known (17) Arc, spark from operating equipment or switch (26) Torch operation, other than cutting and welding. Included are plumbers' furnaces, blow torches, plumbers' torches, Bunsen burners, soldering and heating operations, paint stripping torches, and other torch operations. (43) Hot ember, ash. (53) Fireworks. Included are sparklers. (63) Paper cap, party popper (64)
Other Heat Sources.	All codes not used above, except unknown heat sources.
Unknown Heat Sources	00, missing codes, and blanks
Form of Material Ignited	
Upholstered Furniture	21
Not Upholstered Furniture	All codes except 21 and unknown form of material ignited
Unknown Form of Material Ignited	00

Appendix 4
Upholstered Furniture Fire Loss Edit Procedure

Small Open Flame and Smoking Material Sources			
Variable	**Furniture - Addressable (In scope)**	**Furniture - Not Addressable (Out of scope)**	**Not Furniture**
Type of Material First Ignited	Plastic (40-49) Natural Product, insufficient information to classify further (50) Rubber (51) Leather (53) Grain, natural fiber (pre-process) (55) Included are feathers, felt, kapok, hessian, hemp, sisal, jute, cocofilm, flax, and cotton. Natural Product not classified above (59) Fabric, Textile, Fur (70-74, 77-79) Man-made fabric, fiber, finished goods (71) Cotton, rayon, cotton fabric, finished goods (72) Wool, wool mixture fabric, finished goods (73) Fur, silk, other fabric, finished goods (74) Unknown type of fabric, textile, fur (70,79) Type of Material not classified above (99) Missing data codes (00, ??, blanks)	Sawn Wood (63) Hardboard, plywood (65) Fiberboard (low density material), wood pulp (66) Cardboard (68)	All remaining codes
Area of Origin	Means of Egress (01-03, 05-09) Assembly, Sales Areas (11-19) Function Areas (21 – 39) Storage Areas (41 – 49) Service Areas (51, 56, 58-59) Service, Equipment Areas (60-69) *Structural Areas (71-74, 76-77, 79)* Other Area of Origin (91-99) Missing data codes (00, ??, blanks)	Transportation, Vehicle Areas (80-89)	Escalator (04) Utility shaft (52) Light shaft (53) Chute (54) Duct (55) Chimney (57) *Wall assembly, concealed wall space (75)* Awning (78)
Ignition Factors	Misuse of Heat of Ignition (30-34,36-39) Misuse of Material Ignited (40, 45-49) Mechanical Failure, Malfunction (50-53, 56-59) Design, Construction, Installation Deficiency (60-69) *Operational Deficiency (70-79)* Natural Condition (80-89) Other Ignition Factor (90-91, 99) Missing data codes (00, ??, blanks)	Cutting, welding too close (35) Fuel spilled, released accidentally (41) Improper fueling technique (42) Flammable liquid used to kindle fire (43) *Washing part, cleaning, refinishing, painting (44)* Short circuit, ground fault (54) Other electrical failure (55) Rekindle from a previous fire (92)	
Equipment Involved in Ignition	Other object, insufficient information to classify further (90) No equipment involved (98) Other object not classified above (99) Missing data codes (00, ??, blanks).	All remaining codes	

Appendix 4 (Continued)
Upholstered Furniture Fire Loss Edit Procedure

Additional Small Open Flame Sources Potentially Addressable			
Variable	**Furniture - Addressable (In scope)**	**Furniture - Not Addressable (Out of scope)**	**Not Furniture**
Type of Material First Ignited	Plastic (40-49) Natural Product, insufficient information to classify further (50) Rubber (51) Leather (53) Grain, natural fiber (pre-process) (55) Included are feathers, felt, kapok, hessian, hemp, *sisal, jute, cocofilm, flax, and cotton.* Natural Product not classified above (59) Fabric, Textile, Fur (70-74, 77-79) Man-made fabric, fiber, finished goods (71) Cotton, rayon, cotton fabric, finished goods (72) Wool, wool mixture fabric, finished goods (73) Fur, silk, other fabric, finished goods (74) Unknown type of fabric, textile, fur (70,79) Type of Material not classified above (99) Missing data codes (00, ??, blanks)	*Sawn Wood (63)* Hardboard, plywood (65) Fiberboard (low density material), wood pulp (66) Cardboard (68)	*All remaining codes*
Area of Origin	Means of Egress (01-03, 05-09) Assembly, Sales Areas (11-19) Function Areas (21 – 39) Storage Areas (41 – 49) Service Areas (51, 56, 58-59) Service, Equipment Areas (60-69) Structural Areas (71-74, 76-77, 79) Other Area of Origin (91-99) Missing data codes (00, ??, blanks)	Transportation, Vehicle Areas (80-89)	Escalator (04) Utility shaft (52) Light shaft (53) Chute (54) Duct (55) Chimney (57) Wall assembly, concealed wall space (75) Awning (78)
Ignition Factors	Misuse of Heat of Ignition (30-34,36-39) Misuse of Material Ignited (40, 45-49) Mechanical Failure, Malfunction (50-59) Design, Construction, Installation Deficiency (60-69) Operational Deficiency (70-79) Natural Condition (80-89) Other Ignition Factor (90-91, 99) Missing data codes (00, ??, blanks)	Fuel spilled, released accidentally (41) Improper fueling technique (42) Flammable liquid used to kindle fire. (43) Washing part, cleaning, refinishing, painting (44) Rekindle from a previous fire (92)	
Equipment Involved in Ignition	All codes		

Appendix 4 (Continued)
Upholstered Furniture Fire Loss Edit Procedure

Other or Unknown Forms of Heat			
Variable	**Furniture - Addressable (In scope)**	**Furniture - Not Addressable (Out of scope)**	**Not Furniture**
Type of Material First Ignited	Plastic (40-49) Natural Product, insufficient information to classify further (50) Rubber (51) Leather (53) Grain, natural fiber (pre-process) (55) Included are feathers, felt, kapok, hessian, hemp, sisal, jute, cocofilm, flax, and cotton. Natural Product not classified above (59) Fabric, Textile, Fur (70-74, 77-79) Man-made fabric, fiber, finished goods (71) Cotton, rayon, cotton fabric, finished goods (72) Wool, wool mixture fabric, finished goods (73) Fur, silk, other fabric, finished goods (74) Unknown type of fabric, textile, fur (70,79) Type of Material not classified above (99) Missing data codes (00, ??, blanks)	Sawn Wood (63) Hardboard, plywood (65) Fiberboard (low density material), wood pulp (66) Cardboard (68)	All remaining codes
Area of Origin	Means of Egress (01-03, 05-09) Assembly, Sales Areas (11-19) Function Areas (21 – 39) Storage Areas (41 – 49) Service Areas (51, 56, 58-59) Service, Equipment Areas (60-69) Structural Areas (71-74, 76-77, 79) Other Area of Origin (91-99) Missing data codes (00, ??, blanks)	Transportation, Vehicle Areas (80-89)	Escalator (04) Utility shaft (52) Light shaft (53) Chute (54) Duct (55) Chimney (57) Wall assembly, concealed wall space (75) Awning (78)
Ignition Factors	All codes		
Equipment Involved in Ignition	All codes		

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UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, DC 20207

Memorandum

Date: 28 August 2001

TO : Dale Ray, Project Manager, Upholstered Furniture
Directorate for Economic Analysis

THROUGH: Susan Ahmed, Ph.D., Associate Executive Director
Directorate for Epidemiology

Russell Roegner, Ph.D., Director RR
Division of Hazard Analysis

FROM : Mark S. Levenson, Ph.D. ML
Division of Hazard Analysis

SUBJECT : Upholstered Furniture Fire Investigations Update:
August 1999 to July 2001

Upholstered Furniture Fire Investigations Update: August 1999 to July 2001

Introduction

The U.S. Consumer Product Safety Commission (CPSC) has previously reported on the analysis of in-depth investigations of small open-flame ignitions of upholstered furniture.[1] The report covered 146 investigations initiated from October 1994 to July 1999. From October 1994 to February 1997, CPSC staff conducted an active effort to search for relevant cases. The effort involved CPSC field investigators working with local fire departments. Since that period, CPSC headquarters staff has identified relevant cases through ongoing hazard identification sources such as newspaper clippings, consumer complaints, and other active fire studies.

This present report summarizes recent in-depth investigations, covering the period from August 1999 to July 2001. In this period, 38 investigations were categorized as small open-flame ignitions of upholstered furniture. Of the 38 investigations, only 8 were initiated as upholstered furniture investigations (CPSC Category ID: BUNN25). Fourteen cases were initiated as candle investigations (CPSC Category ID: BUNN41), 12 were initiated as cigarette lighter investigations (CPSC Category ID: CARM07), 3 were initiated as compliance investigations (CPSC Category ID: SECT15, SECTJJ, SECTVC), and 1 was initiated as a general fire and thermal burn investigation (CPSC Category ID: BUNN01). Because investigations were part of other focused studies, they may not accurately reflect upholstered furniture fires in general. Additionally, information particular to upholstered furniture fires is often not present in the investigation reports.

Table 1 summarizes the ignition sources in the 38 investigations. The sources of ignition closely parallel the distribution of the above study categories.

Table 1: Source of Ignition

Source of Ignition	Number of Fires
Cigarette lighter	11
Candle	15
Matches	7
Cigarette lighter or matches	3
Charcoal or multipurpose lighter	2
Total	38

[1] Ault, K., December 1999, "Small Open Flame Ignitions of Upholstered Furniture," U.S. Consumer Product Safety Commission.

Findings

- Fifteen of the 38 cases involved deaths. In these 15 cases, there was a total of 27 deaths. The age distribution of the 27 deaths is given in Table 2.

Table 2: Age Distribution of Deaths

Age of Victim	Number of Deaths
Under 5	9
5 to 14	9
15 to 64[2]	7
Over 65	2
Total	27

- Twenty-six of the 38 cases involved injuries. In these 26 cases, there was a total of 38 injuries. The age distribution of the 38 injuries is given in Table 3.

Table 3: Age Distribution of Injuries

Age of Victim	Number of Injuries
Under 5	15
5 to 14	4
15 to 64[3]	19
Over 65	0
Total	38

- Thirty-six cases included some information about the extent of the damage. In all these cases, the fire damage extended beyond the furniture. In 10 cases, the damage was predominately confined to the room where the fire was initiated. For the 26 other cases, the damage extended beyond the room, often resulting in severe property damage. Twenty-five of the 38 cases reported a numeric value for property loss. The median property loss for these 25 cases is $35,000.

- Twenty-three of the 38 cases involved fires started by children. In 14 of these cases, the child was under 5 and in 9 cases, the child was between 5 and 14. Among the 23 cases, 11 involved deaths, resulting in a total of 22 deaths. Thirteen involved injuries, resulting in a total of 35 injuries.

[2] Two victims described as teenagers and three victims described as adults are included in this group.
[3] Nine victims described as adults are included in this group.

- Two cases involved fires in which disabled children died. In one of these cases, 3 children described as autistic died. In the other case, a child described as "delayed in social development" and with a slight hearing impairment died. In a third case, the fire was started by a 9-year-old child described as mentally challenged.

- Thirty-three of the 38 cases involved furniture that was described as some type of sofa, e.g., sofa, couch, sofa/loveseat, sofa/sleeper. Five of the 38 cases involved furniture that was described as a chair. Details on the furniture are very limited. In 23 cases, no further details were provided. In 7 cases, the furniture is described as old or at least 10 years old. In 2 cases, the furniture was said to be purchased new and in 4 cases it was said to be purchased used. No cases mentioned that the furniture was reupholstered or had slipcovers. Three cases mentioned some sort of foam filling and one case mentioned a label that furniture met the California Bureau of Home Furnishing's Flammability requirement.

- In only 15 of the 38 cases was there any information on the part of the furniture that first ignited. Cushions appear to be involved in 8 cases, backs or sides were involved in 4 cases, "some fabric" was involved in 2 cases, and the underside was involved in 1 case.

- Thirty-four of the 38 cases included information on the presence of smoke alarms. In twenty-six of these cases, there was a smoke detector present. In 17 cases, it was known whether the alarm sounded or not. In 14 of the 17 cases, the alarm sounded.

Small Open Flame Ignitions of Upholstered Furniture

Kimberly Ault, Ph.D.
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U. S. Consumer Product Safety Commission
Washington, D.C. 20207

December 6, 1999

Small Open Flame Ignitions of Upholstered Furniture

Table of Contents

Small Open Flame Ignitions of Upholstered Furniture
Executive Summary

Since October 1994, CPSC has been collecting information on upholstered furniture fires associated with small open flame sources. Following are the key results of the study from October 1994 to July 1999:

- Of the 146 investigated fires, 117 involved sofas/couches and sofabeds, 28 fires involved upholstered chairs, and 1 fire involved an upholstered ottoman. The median reported age of furniture involved in these fires was five years.

- Of the 146 investigated fires, 80 fires reported the ignition location. The seating area (consisting of the cushion, the inside of the arm, and the inside back of the sofa/couch or chair) was identified as the portion first ignited in 50 fires. The outer back and outer side were identified as the portion first ignited in 20 fires, the underside of the upholstered furniture was cited in 7 fires, and the skirt was identified as the portion first ignited in 3 fires.

- The reported small open flame sources associated with the upholstered furniture fires were cigarette lighters (95), matches (19), candles (25), and other ignition sources that included a fireworks sparkler, a spark from a gas heater, and a flare gun. The four remaining fires were said to have been started by either a cigarette lighter or a match, but the fire department could not determine which of the two.

- The most frequent cause of fire was children playing (120 fires or 82%). The remaining 26 fires were reportedly caused by candles tipping over and falling on the upholstered furniture (22 fires or 15%) and other miscellaneous ignition factors (4 fires or 3%).

- Among the 120 child play fires, 88 fires involved children less than 5 years of age as the fire-setters and 30 fires involved children between 5 and 14. The ages of two children were unknown.

- In the 146 investigated fires, there was a total of 79 deaths and 86 injuries for a combined total of 165 fire casualties. Most of the victims suffered from smoke inhalation or thermal burns.

I. Background

Since the early 1970s, the U.S. Consumer Product Safety Commission (CPSC) has been interested in upholstered furniture fires. During the 1970s and 1980s, most of the CPSC's efforts focused on cigarette ignitions of upholstered furniture. In 1974, the Upholstered Furniture Action Council (UFAC) was founded to make upholstered furniture more resistant to ignition from smoldering cigarettes, which was the leading cause of upholstery fires in the home. In 1980, CPSC staff analyzed data on upholstered furniture fires, focusing on the ignition sources involved.[1] The 1980 report concluded that fire deaths associated with upholstered furniture were more likely to occur in cigarette-ignition fires rather than in open flame fires.

In 1993, the National Association of State Fire Marshals (NASFM) petitioned CPSC to establish mandatory upholstered furniture flammability standards and suggested that such standards should incorporate the state of California's existing requirements. The California requirements specify tests for cigarette ignition, small open flame ignition sources, and large open flame ignition sources. Following this petition, CPSC staff attempted to identify any differences between upholstered furniture fires in California and those fires occurring in the rest of the United States.[2] CPSC staff reported that the risk of fire deaths and injuries decreased at a greater rate in California than in the rest of the United States but that the decrease could not be directly attributed to the California standards. In May 1994, the Commission voted to grant the petition requesting development of a flammability standard to address risks of death, injury, and property loss from small open flame ignitions of upholstered furniture, and published an Advance Notice of Proposed Rulemaking under the Flammable Fabrics Act.

Following the vote of the Commission, CPSC staff began a project addressing small open flame fire risks associated with upholstered furniture. As a part of this project, the Directorate for Epidemiology conducted an in-depth fire investigation study of small open flame ignitions of upholstered furniture. In this study, items of interest

included the portion of the upholstered furniture first ignited such as the seating area, the dust cover (underneath the furniture), or the skirt; the age of the person involved in the ignition of the upholstered furniture; the source of small open flame (match, lighter, candle, etc.); the furniture age; the presence and performance of smoke detectors in the residence; and household characteristics.

This report presents national fire estimates for upholstered furniture open flame fires and the findings of the investigation study.

II. Methodology

In October 1994, CPSC began a data collection effort to identify factors related to open flame ignition of upholstered furniture. CPSC staff collected information on fires occurring in residential structures that involved ignition of upholstered furniture (sofas/couches and chairs) by small open flame sources such as matches, cigarette lighters, and candles. Every CPSC Regional Field Office and Satellite Office participated in the data collection. Between October 1994 and February 1997, the investigators were assigned the responsibility of case identification and follow-up investigations of in-scope incidents. The investigators met with local fire departments to discuss the goals of this study and to gain the fire departments' assistance in rapidly identifying all fires that were in-scope. Once fire department cooperation was established, the investigators maintained weekly contact with the fire departments for reviews of the departments' records of relevant cases. The investigations consisted of either on-site visits or telephone interviews with the victims and/or fire departments. After February 1997, CPSC headquarters staff identified in-scope fires through its other case-identification sources, such as newspaper clippings, medical examiner reports, and consumer complaints.

Between October 1994 and July 1999, the CPSC investigated 146 fires where upholstered furniture was ignited by a small open flame source. An in-scope fire was a residential structural fire that involved ignition of upholstered furniture by a small open